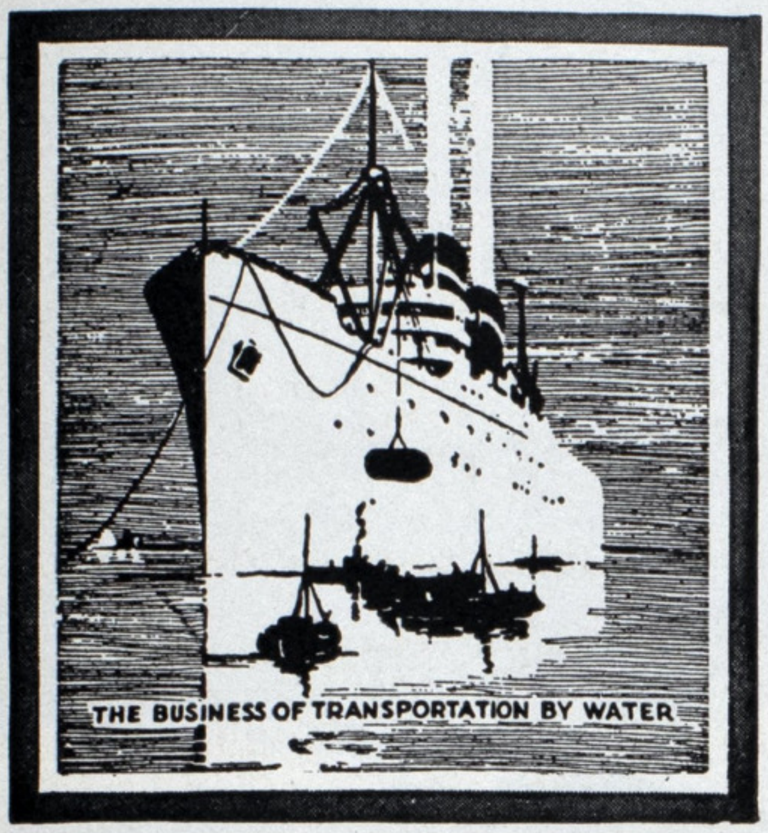
Marine Review

The National Publication Covering the Business of Transportation by Water

CLEVELAND FOUNDED 1878 NEW YORK



**Published monthly by
The Penton Publishing Co.
Cleveland, Ohio, U. S. A.**

Cleveland Office, Penton Bldg.
A. H. Jansson, *Editor*
H. O. Taylor, *Advertising Manager*

Chicago Office, 1347 Peoples Gas Bldg.
L. C. Pelott
Fred B. Pletcher

New York Office, 220 Broadway,
Joseph Fuller, *Eastern Manager*
E. C. Kreutzberg
B. K. Price
H. R. Simonds

Pittsburgh Office, 507-8 Oliver Bldg.
S. H. Jasper
W. G. Gude

San Francisco Office, 681 Market St.
N. C. Nourse

**Washington, D. C. Office,
1020 National Press Building**
L. M. Lamm

**London Office, Caxton Ho
Westminster, S. W. 1**
Vincent Delport

CONTENTS

Vol. 61 **November 1931** *No. 11*

MARINE REVIEW is a member of the Audit Bureau of Circulations, Associated Business Papers Inc. and the National Publishers Association. Entered at the Post Office at Cleveland, Ohio, as Second Class Matter, under the act of March 3, 1879. Copyright 1931 by The Penton Publishing Co., Cleveland, O.

Subscription United States and its possessions, $3 per year; Canada $4.00; Great Britain and other Foreign Countries, £1:0:0. Single copies 35 cents. Back numbers over three months 50 cents. Cable addresses: Penton, Cleveland, and Irotrapen, London.

Marine Diesel Engine

Insert section of the

November 1931 Issue

Marine Review

New York London Cleveland

« EDITORIAL »

Position of Diesel Power in American Vessels

AS IN former years in this issue of MARINE REVIEW an attempt has been made to present in a practical manner the position of the diesel engine in marine propulsion in the United States. The plan of presentation continues the same, which is to illustrate by actual installations just what the trend and progress has been in the marine application of this type of power.

Though the United States now stands second to Great Britain and Ireland in shipbuilding under way, it has been found in the search for practical installations that only one American diesel engine builder has built and installed in any vessel what might be termed a large powered diesel engine, and the largest engine which this company built and installed for marine use is only 2800 brake horsepower. In other words, the largest American marine diesel engine installation accomplished or projected is under 3000 horsepower.

Few Orders Placed for Larger Engines

NOTHING else that can be said here can be as significant of the true status of the diesel engine in the American merchant marine in the larger powers. A number of important vessels have been completed and others have been under construction in American shipyards during the past year, but in every instance, with the comparatively insignificant exception noted above and any similar vessel by the same company, these new vessels that are now being added to the merchant marine are propelled by the use of steam power; invariably turbines, either reduction geared or electric motor drive. No other fuel is thought of than oil for making steam on these ships. In this respect, therefore, in the United States we are following diametrically the opposite course to that recommended by the managing director of the well-known Danish diesel engine building company in his paper before the Institution of Naval Architects in March of this year. He said: "At the present stage of the marine diesel engine it is adaptable for all types of ships from a 35-horsepower engine such as is used in fishing craft to a 20,000-horsepower plant as installed in the motorship BRITANNIC," and finally, "that the diesel engine should be adopted when burning oil and the steam engine when burning coal."

The picture is entirely different when it comes to the application of diesel engines from 1000 horsepower down. In this range the United States is not only keeping pace with, but is probably ahead of European practice. The variety of applications are well illustrated by the 10 different marine installations in the lesser powers given in the following pages. The installation shown in each case it must be remembered is the choice of the diesel engine builder represented as one of his best.

Use of the internal combustion engine in world merchant tonnage on a large scale is noted in the quarterly review of Lloyd's Register of Shipping. Of the 505,258 gross tons of tankers building in the world as of Sept. 30, no less than 474,978 tons are fitted with this type of power. This represents 94 per cent in tonnage of all tankers now building.

Many Smaller Units are Installed

THE review also shows that a greater tonnage of vessels equipped with diesel propelling power is now being built than of all other types combined. The proportion in motorships under construction at the end of the quarter Sept. 30, is 50.7 of all construction which is an increase of three per cent above the end of the second quarter. On Sept. 30, there were under construction in the world 776,431 gross tons of motorships and 754,689 vessels with other types of power. The proportion of motorships in the total shipbuilding of Great Britain and Ireland moved up from 38 per cent at the end of the June quarter to 40 per cent at the end of September. In all the other countries combined the percentage in motorships moved up to 55 per cent of all

construction as compared with 52 per cent at the end of June.

No shipowner, ship operator or naval architect in considering the type of power for a new ship can well ignore the fact that in Great Britain and Ireland 162,721 gross tons of motorships were under construction at the end of September as compared with 254,664 gross tons in other types of power.

A comparison of the motorship construction under way in Great Britain and Ireland and the United States with its 13,007 gross tons at the end of September, showing the weakness of the latter in this type of power, is strikingly emphasized in the character of the American diesel vessels illustrated and described in the following pages. What are the reasons for this apparent lack of interest in this type of power in larger vessels? The answer is not simple. One important factor enters into the question. Practically no cargo ships have been laid down in the United States for several years. When the time comes, as it soon must come, for building cargo liners, diesel power will be given careful consideration.

In the meantime, without any marine orders for larger powered engines, the leading American builders of diesel engines have been gaining in experience and in efficiency in building this type of power through the demands of industry for economical power ashore.

For successful application it is necessary for all parties concerned, shipowner, shipbuilder, naval architect and marine engineer and the builder of the engine, to work together with a unity of desire to overcome all difficulties.

Choice Should be Based on Results

THE diesel engine manufacturer is competing with the builder of steam machinery for the decision of the ship owner. The decision of the owner should be freely made solely on the basis of performance which with the same care and effort in operation will produce for him the greatest revenue. This simple statement covers a multitude of complicated facts which the engine builder, the shipowner with his naval architect, and the shipbuilder must carefully consider in complete harmony and co-operation without heat or prejudice. Though the primary function of the engine builder is to produce the most perfect practical engine possible, he must also have a correct appreciation of the problems of the shipowner and his naval architect and the shipbuilder when it comes to choosing the propelling power in any case.

From the records it is apparent that in the lesser powers from 1000 horsepower down the diesel engine is finding widespread acceptance in all types of commercial craft in the United States. For years, in MARINE REVIEW in the April issue an accurate analysis has been presented on types of motive power in commercial vessels of steel above 100 feet in length. This analysis in the last April issue showed that out of 130 vessels in this category under construction in some stage during the calendar year 1930, no less than 60 units had the diesel engine as primary power. During the year 1929 out of 145 vessels, 80 units had the diesel engine as primary power. This is definite proof that about 50 per cent in number of vessels built in the United States are being regularly equipped with diesel power. The proportion for 1931 is likely to be the same.

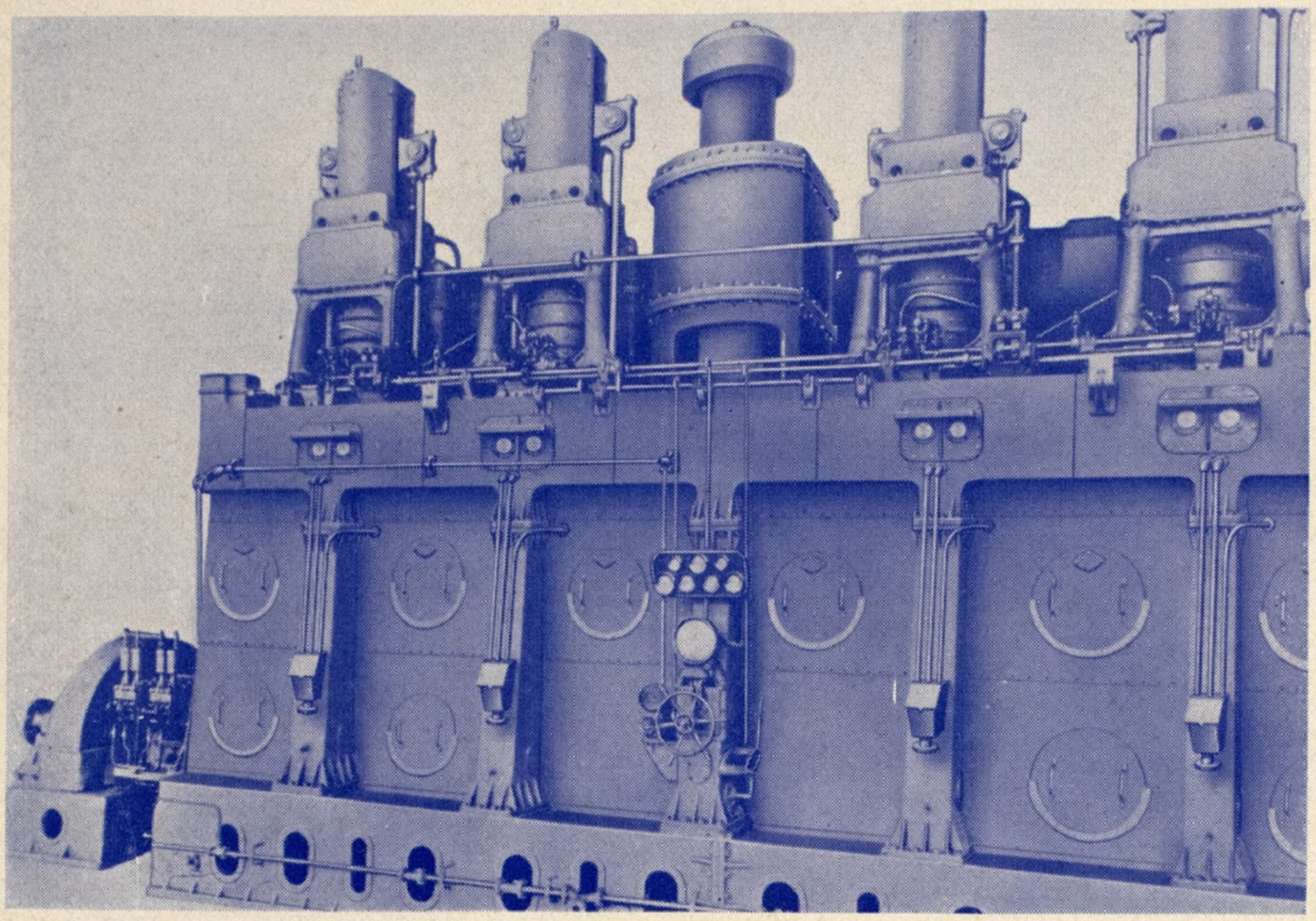
But this is not the whole story, the gross tonnage and horsepower give an entirely different aspect. The 130 vessels listed as under construction in 1930, represents a total gross tonnage of 520,313 while the 60 units with diesel power account for only 131,303 gross tons or about 25 per cent. The total horsepower in the 130 vessels amounted to 508,052, whereas the total horsepower of the 60 vessels with diesel power amounted to only 64,495, or 12.65 per cent. There is no reason to think that these proportions will be materially changed when the records for 1931 are worked out. These figures, therefore, present the true position at the present time of diesel power in marine propulsion in the United States. In units so powered the comparison is favorable with other nations, but it is clearly evident that we do not begin to approach any of the other nations in the use of the diesel engine when we consider the size of vessel and amount of power. The average horsepower per unit in the new construction during 1930 is only 1075.

Taking Stock of European Popularity

AS A nation the United States cannot afford to ignore the significance of the popularity of the diesel engine in the merchant marine of other nations. Copying what other people do has not been a characteristic of Americans, and even the world must admit that they have done pretty well in pursuing their own engineering developments along original lines. It is not good sense, however, to completely ignore what the other fellow is doing and what his reasons for so doing may be. We cannot dismiss with indifference the threat to our competing position on the seas of the diesel engine in the hands of our European and British rivals.

Diesel Direct Drive in Tanker Daylight

One Engine—2800 B.H.P.



DESCRIPTION

One engine as illustrated and described here is direct connected to a single propeller driving the 14,593 deadweight ton tanker DAYLIGHT at a sea speed of 11 knots. The engine is of the vertical, two cycle, four-cylinder, long stroke, slow speed, heavy duty, crosshead direct reversible opposed piston type and uses medium compression with solid or mechanical injection system of fuel atomization. The rated horsepower is obtained at the low speed of 80 revolutions per minute.

Engine

Name of Engine—Sun Doxford; **Year**—1931
Builder—Sun Shipbuilding & Dry Dock Co.
Cycle—2; **No. of Cylinders**—4; **I.H.P.**—3256
B.H.P.—2800; **Action**—Single; **Injection**—Solid
Scavenging—Attach; **Piston Coolg.**—Fresh Water
Bore—23⅝ in.; **Stroke**—91 1/3 in.; **R.P.M.**—80
Piston Speed—609 ft. p.m.; **Press. Indicated**—101
Pressure Brake—87; **B.H.P. per Cyl.**—700
I.H.P. per Cylinder—814; **Mechanical Eff.**—86%
Stroke to Bore—3.87; **Wkg. Str. per Rev.**—Four
Lgth. O.A.—56 ft. 2 in.; **Hght. O.A.**—32 ft. 1 in.
Width Overall—13 ft. 5 in.; **Reversing**—Direct
Weight—780,000 lbs.; Per B.H.P.—278 lbs.
Air Compressors—Two, one motor, one steam

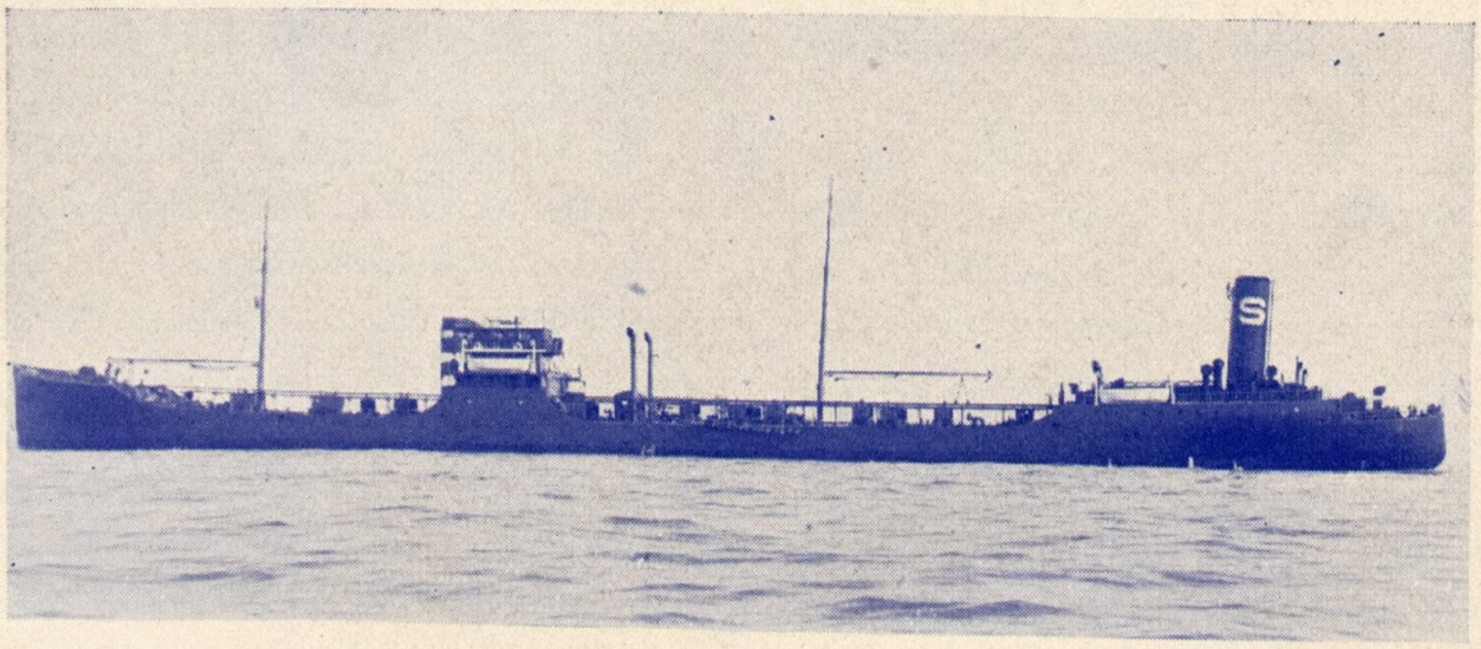
Vessel

Name—Daylight; **Builder**—Sun S.B. & D.D. Co.
Type—Single screw ocean going oil tanker
Owner—Standard Transportation Co., New York
Completed—June 1, 1931
Main Drive—One diesel engine direct connected
Length B.P.—480 ft. 6 in.; **Beam**—65 ft. 9 in.
Depth—37 feet; **Draft**—29 feet
Displ.—20,437 tons; **Deadweight**—14,593 tons
Speed in Knots—11; **No. of Propellers**—One
Fuel Capacity—Barrels, 11,841; or 1671 tons
Fuel Consumption—Lb. per b.h.p. per hr.—0.37
Lb. i.h.p. per hr.—0.32; tons a day—12.3
Radius Without Refueling—28,800 naut. miles
Generators—Two, 75 k.w. each at 325 r.p.m., General Electric, driven by Cooper-Bessemer 3-cylinder, 120 h.p. diesel engines

Remarks

This vessel is generally similar to the tanker BRILLIANT built by the same shipyard for the same owner. She is of the two-deck type with straight stem and cruiser stern and is built on the Isherwood longitudinal bracketless system.

There are nine main cargo tanks, also shelter deck, poop, bridge and forecastle decks of steel. The main propelling machinery is one opposed piston type diesel engine as described and illustrated on this page, located in the stern of the vessel. Illustration shows the tanker BRILLIANT.

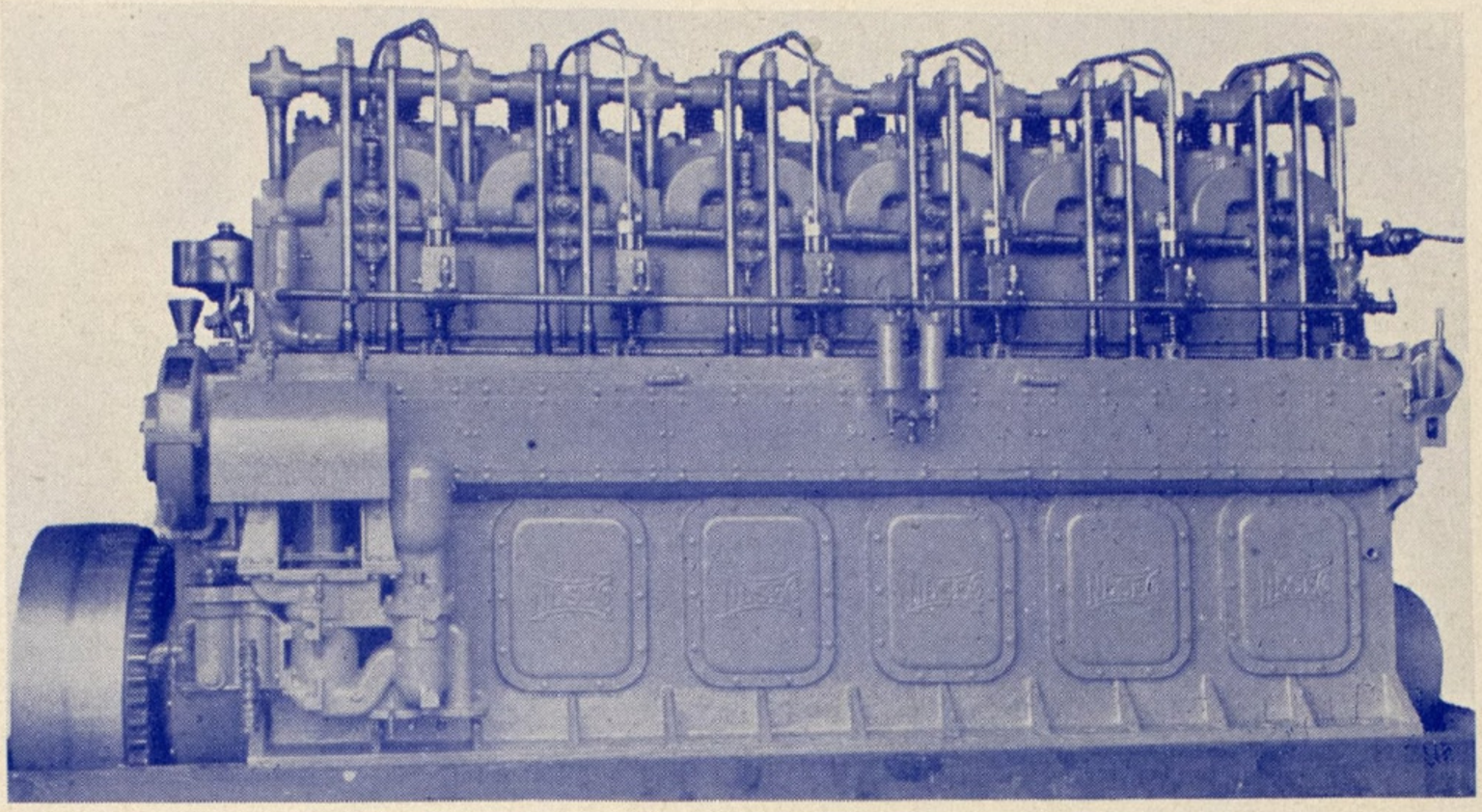


Diesel Direct Drive in Tanker Supreme

Two Engines—Each 350 B.H.P.

DESCRIPTION

The SUPREME and sister tanker HARMONY built for the Gulf Refining Co. by the Bethlehem Shipbuilding Corp. for canal and coastwise service are twin screw diesel direct drive. Each engine, as illustrated and described is connected to a propeller. The engines are reversible and readily maneuvered. They are of the four-cycle, single acting, solid injection type of six cylinders. This makes an economical and easily handled power plant.



Engine

Name of Engine—Nelseco; **Year**—1931
Builder—Electric Boat Co.; N.L.S. & E. Works
Cycle—4; **No. of Cylinders**—6; **I.H.P.**—437
B.H.P.—350; **Action**—Single; **Injection**—Solid
Piston Coolg.—No; **Bore**—12½ in.; **Str.**—18 in.
R.P.M.—280; **Piston Speed**—840 feet per min.
Pressure Indicated—93.8; **Pressure Brake**—74.6
B.H.P. per Cyl.—58 1/3; **I.H.P. per Cyl.**—72.8
Mechanical Eff.—80%; **Stroke to Bore**—1.44
Wkg. Strokes per Rev.—Per engine, three
Length O.A.—14 ft. 2¼ in.; **Width**—4 ft. 11 in.
Height O.A.—8 ft. 5⅛ in. above C.L. of shaft
Weight—One engine, 41,250 pounds
Wght—Per B.H.P.—118 lbs.; **Per I.H.P.**—94 lbs.
Reversing—Direct reversible; **Air Comp.**—None

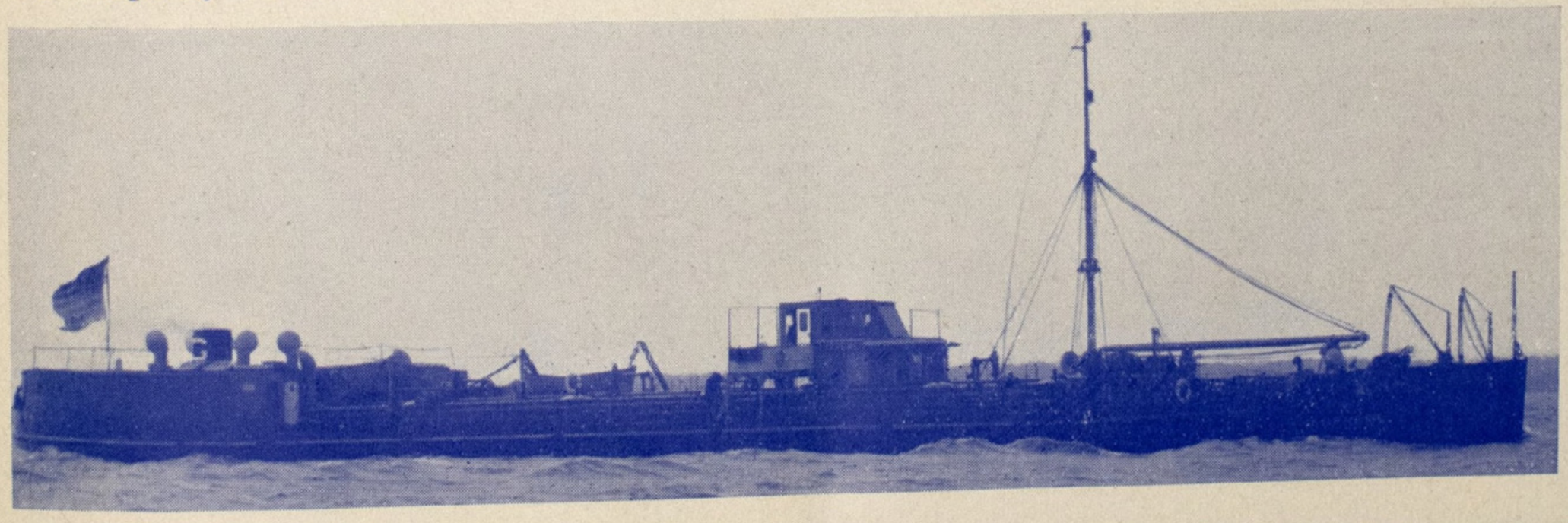
Vessel

Name—Supreme; sister vessel Harmony
Type—Canal and coastwise tanker
Owner—Gulf Refining Co.
Builder—Beth. S.B. Corp., Sparrows Point plant
Completed—In April 1931
Length—Between Perpendiculars, 212 ft. 0 in.
Beam—37 ft. 0 in.; **Depth**—13 feet 9 inches
Draft—10 ft. 9 in.; **Deadweight**—1225 tons.
Speed—In knots, 9.5; **Propellers**—No. of, two
Fuel Capacity—In barrels, 270
Fuel Consumption—Lbs. per b.h.p. per hr.—0.42; lbs. per i.h.p. per hr.—0.33; tons per day—3.16 approximately
Generators—Auxiliary, three Westinghouse. Each 35 kilowatts at 600 revolutions per minute direct connected to diesel engines.

Remarks

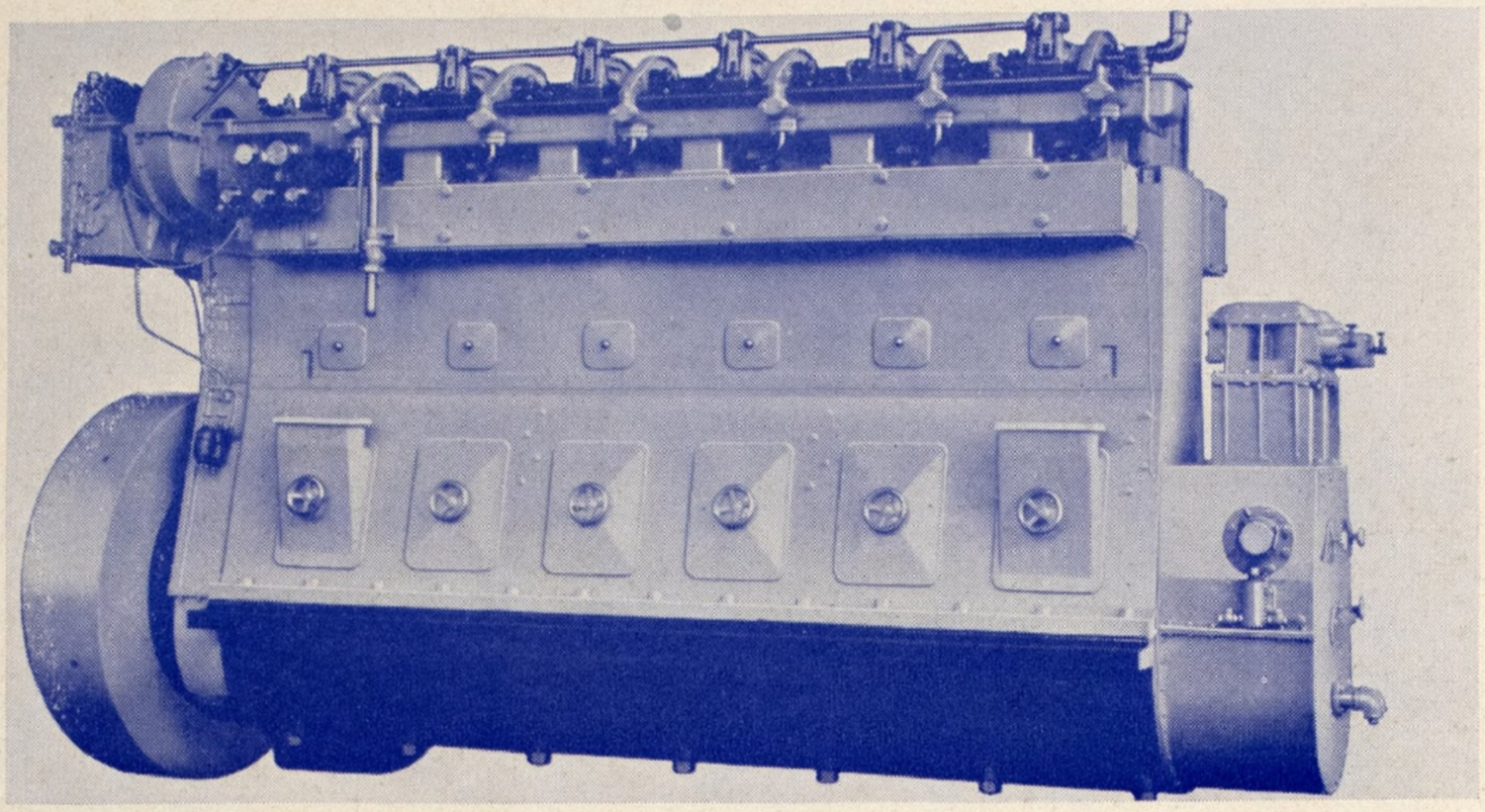
These two tankers were designed for canal and coastwise service based on much practical experience with tankers for such duty. In design, therefore, they can be said to have had the benefit of practical experimentation in hull design and propelling power for vessels in similar service.

The engines used in these tankers, two in each, are of the trunk piston full diesel type. The bedplate and crankcase are of box section in cast iron. The cylinder block, of box shape construction with opening to receive individual liners is of cast iron. Cylinder liners are of special close grained cast iron and the cylinder heads are of special close grained gray iron with an efficient cooling system eliminating excessive heat stresses. The crankshaft is forged from high grade carbon steel ingots and complies with the requirements of the American bureau as well as Lloyds. Steel tie bolts extend from top of cylinder block to bedplate. The main bearings are of cast steel lined with best grade white metal.



Diesel Electric Drive in Tug Prescotont

Two Engines—Each 500 B.H.P.



DESCRIPTION

Two engines of this kind each connected to a 330-killowatt, 250-volt generator, furnish the electric current for one double armature propulsion motor developing 800 horsepower at 105/135 revolutions per minute and 500 volts. The engines are of six-cylinder, four-cycle, solid injection type. Remote control of the main propelling power has been worked out so that the tug can be maneuvered from the bridge of the carfloat.

Engine

Name of Engine—Winton; **Year**—1930
Builder—Winton Engine Corp.; **Cycle**—Four
No. of Cylinders—6; **Brake Horsepower**—500
Action—Single; **Injection**—Solid (Airless)
Piston Coolg.—No; **Bore**—15″; **Stroke**—22″
R.P.M.—245; **Piston Speed**—900 feet per min.
Pressure Brake—70; **B.H.P. per Cylinder**—83 1/3
Stroke to Bore—1.47; **Wkg. Strokes per Rev.**—3
Length O.A.—17 ft. 11¾ in.; **Width O.A.**—5′ 8″
Height—Base to top of engine—10 ft. 9⅝ in.
Weight—Each engine complete, 88,700 pounds
Weight—Pounds per b.h.p. one unit, 177.4
Reversing—None; **Comp.**—Independent—10 h.p.

Vessel

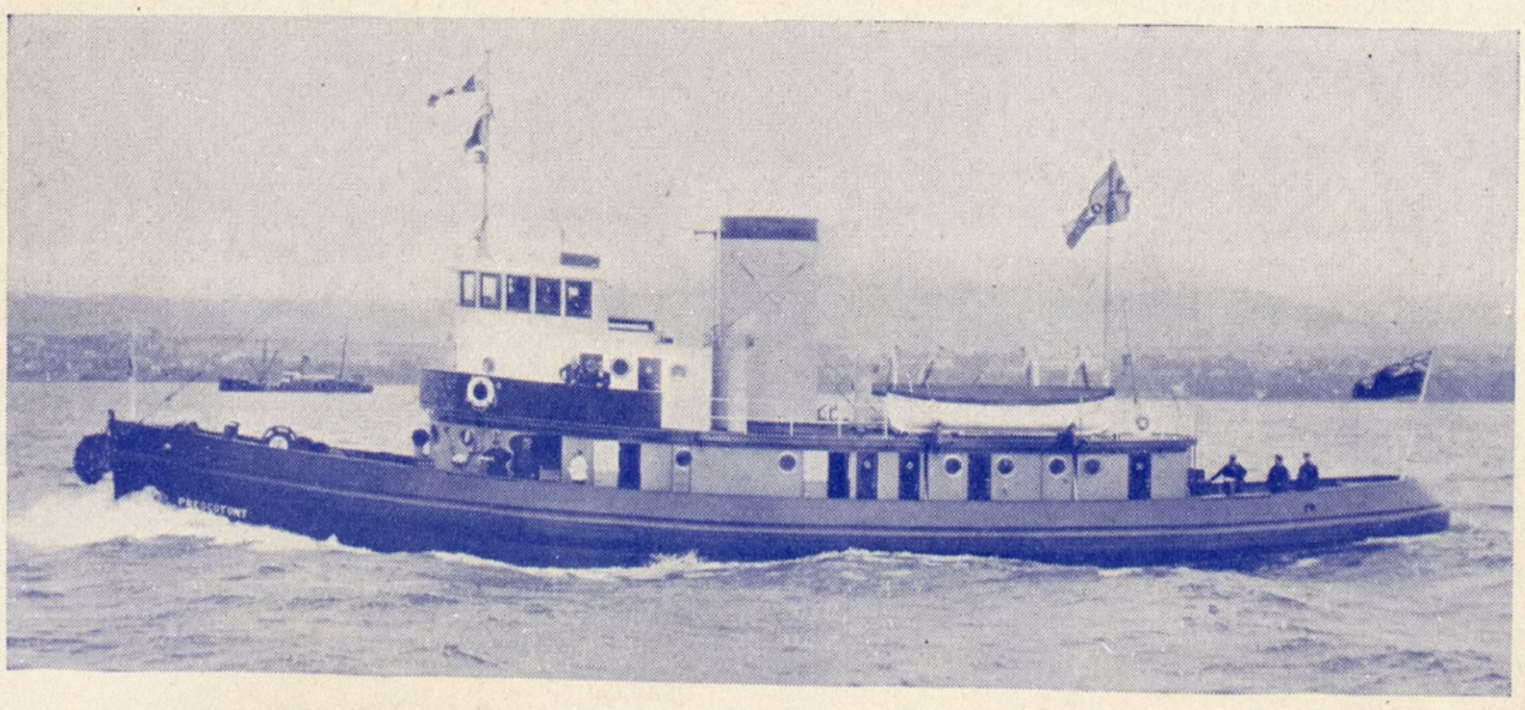
Name—Prescotont; **Type**—For towing carfloat
Owner—Canadian Pacific Car and Passenger Transfer Co., Ltd.
Builder—Davie Shipbuilding & Repairing Co., a subsidiary of Canada Steamship Lines, Ltd.
Completed—Oct., 1930; **Length O.A.**—117 feet.
Beam O.A.—27 feet; **Depth**—13 feet 6 inches
Draft—Extreme, 12 feet; **Speed,** 11 knots
Fuel Consump.—Lb. per b.h.p. per hour—0.45
Main Generators—Two General Electric each of 330 kilowatts, 245 revolutions per minute, 250 volts, each direct connected to the diesel engine described
Propelling Motor—One, General Electric double armature 800 h.p., 105/135 r.p.m., 500 volts, direct connected to propeller.

Remarks

This tug represents a combination of economical development of power with the utmost in flexibility and ability to maneuver at all speeds and under all conditions with a minimum increase in fuel and therefore cost per horsepower unit. From her own bridge or from the bridge of the carfloat in tow, the PRESCOTONT can be handled with great ease and precision.

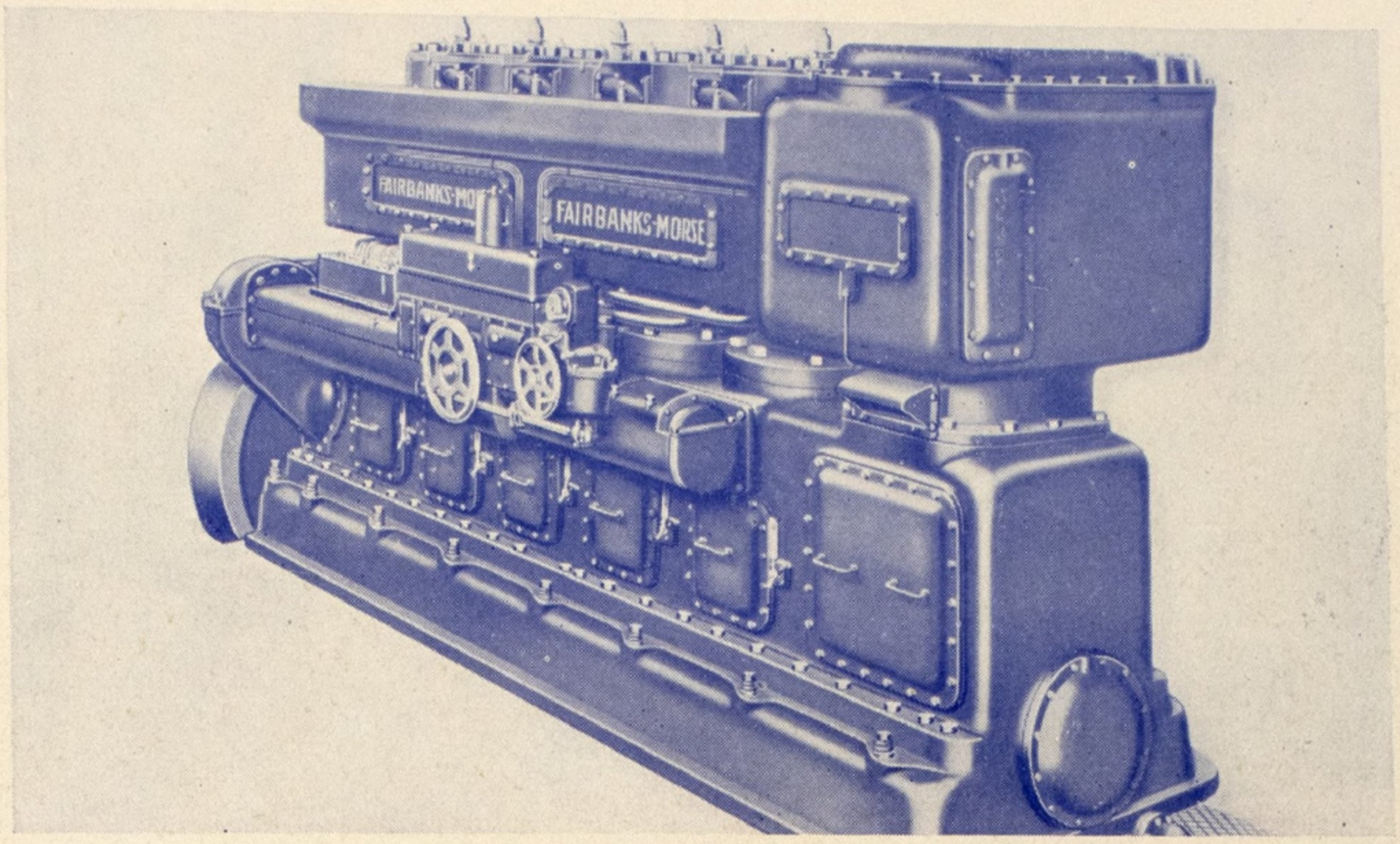
On the carfloat are installed a controller, two operating pedestals and a speed indicator. Cables connect to the electric controls on board the tug so that her operation may be controlled from the bridge of the carfloat. It is also possible to obtain the necessary auxiliary power needed on the carfloat from the tug.

The PRESCOTONT and carfloat were illustrated and described in detail in the December, 1930, MARINE REVIEW.



Diesel Direct Drive in Tug Mamo

Two Engines—Each 750 B.H.P.



DESCRIPTION

This twin screw tug is propelled by two five-cylinder, 750 brake horsepower diesel engines. The engines are completely enclosed and are fitted with built-in air compressor, fuel transfer pump, bilge pump and water circulating pump; also cylinder wiper oil transfer pump and lubricating oil pump. The pistons are oil cooled. Injection is solid.

Engine

Name of Engine—Fairbanks-Morse; **Year**—1931
Builder—Fairbanks, Morse & Co; **Cycle**—Two
No. of Cyls.—5; **B.H.P.**—750; **Action**—Single
Injection—Solid; **Scavenging**—Pump
Piston Coolg.—Oil; **Bore** 16″; **Stroke**—20″
R.P.M.—250; **Piston Speed**—833 feet per minute
B.H.P. per Cyl.—150; **Stroke to Bore**—1.25
Wkg. Strokes per Rev.—5; **Hgth. O.A.**—8′ 8½″
Lgth. O.A.—23 ft. 8 in.; **Width**—8 ft. 10 in.
Weight—117,000 lbs.; **Lbs. per B.H.P.**—156
Reversing—Direct; Air Comp.—For starting only

Vessel

Name—Mamo; **Type**—Twin screw ocean tug
Owner—Young Bros., Ltd., Honolulu, H. I.
Builder—Bethlehem S.B. Corp., Union Plant
Completed—March, 1931
Main Drive—Twin screw, diesel direct
Length O.A.—129 ft. 2 in.; **Length B.P.**—120 ft.
Beam Molded—28 ft.; **Depth Molded**—15 ft. 2 in.
Draft—Loaded, aft, 12 ft. 6 in., for. 11 ft. 6 in.
Fuel Capacity—In bunkers, 985 barrels.
Fuel Consumption—Lb. per b.h.p. per hr.—0.41
Auxiliary Generators—Two of 30 kilowatts at 800 r.p.m. each driven by Fairbanks-Morse diesel engines. The generators are Fairbanks-Morse direct current and are each clutch connected to a two-stage, 50-cubic foot Fairbanks-Morse air compressor. Also an Edison 100-cell storage battery unit with 200 ampere-hour rating.

Remarks

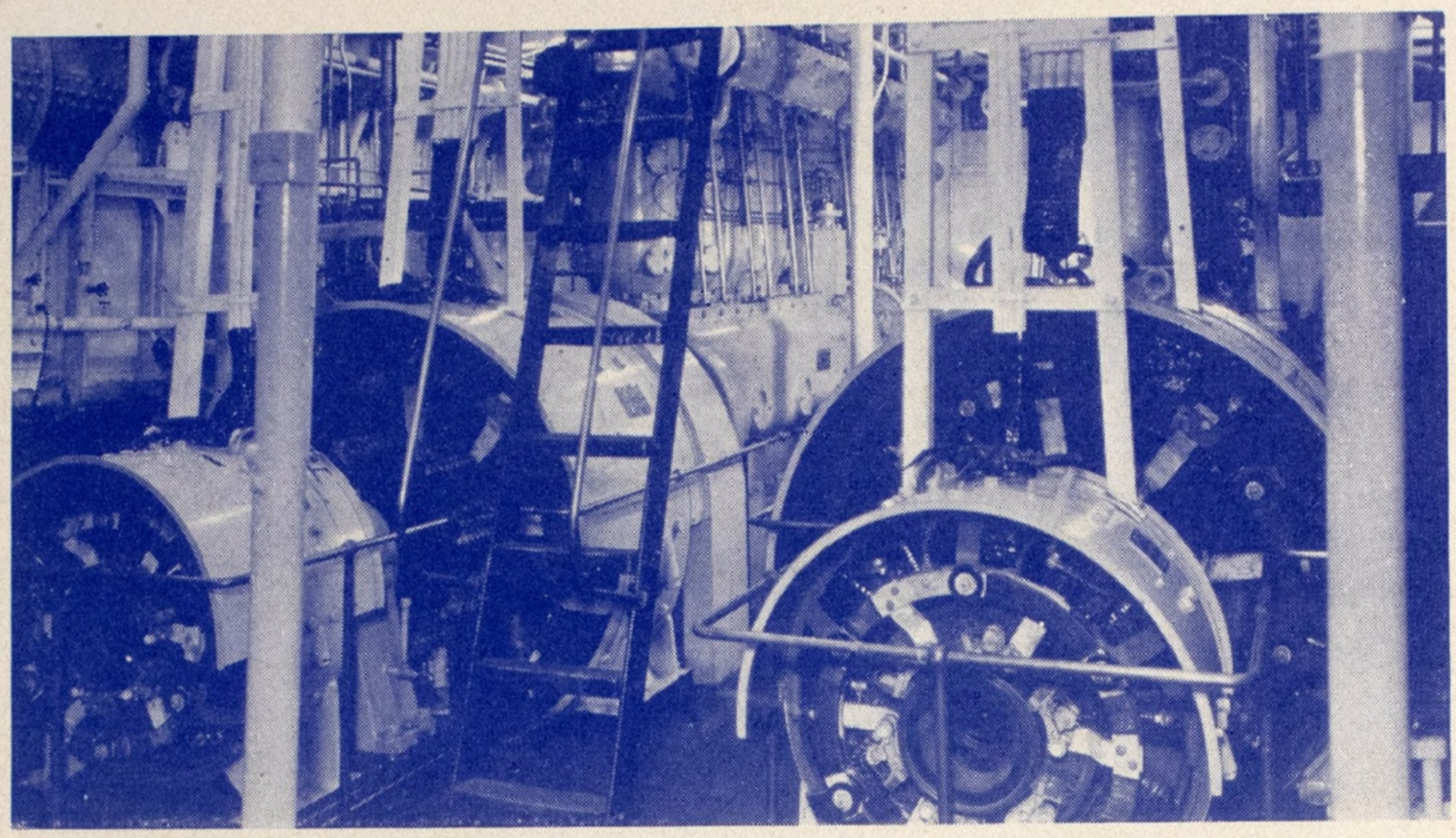
The MAMO is the first steel hull towboat built for the owner, Young Bros., Ltd., who have specialized for many years in the waters of the Hawaiian Islands in towing, fire-fighting, piloting, services of customs and immigration and in carrying freight and tending dredges. Towboats hitherto for this company have been of wood.

In every respect the MAMO is one of the finest ocean going tug boats. Every feature has been studied with care to obtain the maximum of usefulness and efficiency. She has also the appearance to go with such a fine, able vessel.

At the time the MAMO was built the Union plant also constructed for the same owner two steel barges 175 feet long by 44 feet beam and 11 feet deep. The MAMO towed these two barges from San Francisco to Honolulu, a distance of 2100 nautical miles in 10 days, 15 hours and 10 minutes at an average speed of something over eight knots.

Diesel Electric Drive in Tug Cleveland and Class

Two Engines—Each 500 B.H.P.



Engine

Name of Engine—Ingersoll-Rand; **Year**—1930
Builder—Rathbun-Jones Eng. Co.; **Type**—PR
Cycle—4; **No. of Cylinders**—6; **B.H.P.**—500
Action—Single acting; **Injection**—Solid direct
Bore—15 in.; **Stroke**—20 in.; **R.P.M.**—270
Piston Speed—900 feet per minute
Pressure Ind.—81.4 lbs.; **Pres. Brake**—69.1 lbs.
B.H.P. per Cyl.—83¼; **Mech. Efficiency**—85%
Stroke to Bore—1.33; **Wkg. Stkes. per Rev.**—3
Lgth. O.A.—28 ft. 1 in.; **Hgth. O.A.**—10 ft. 7 in.
Width O.A.—4 ft. 9 in.; **Wght. Eng.**—81,000 lbs.
Pounds per B.H.P.—162
Reversing—No, direct connected to generator
Air Compressors—For starting air only

Vessel

Name—Cleveland; Also sister vessels Rochester, Olean, and Scranton
Type—Ocean and harbor tug
Owner—Erie Railroad
Builder—Pusey & Jones Corp.
Completed—10/23/30
Main Drive—Single screw diesel electric
Length B.P.—96 feet; **Beam**—Molded 26 feet
Depth—13 ft. 9 in.; **Draft**—12 ft. 6½ in. aft
Speed—14 miles p.h.; **No. of Propellers**—One
Fuel Capacity—9915 gallons diesel oil
Fuel Consumption—Lbs. per b.h.p. per hr.—0.41
Radius Without Refueling—2500 miles

DESCRIPTION

Propulsive power is delivered to one propeller by one double armature direct current 800 shaft horsepower, 500 volts, electric motor. The electric current is generated by two generators each of 330 k.w., 250 volts, direct connected to six-cylinder four-cycle, solid injection oil engines of 500 brake horsepower at 270 revolutions per minute. Each generator is also direct connected to one 30-k.w. 120 volts exciter.

Remarks

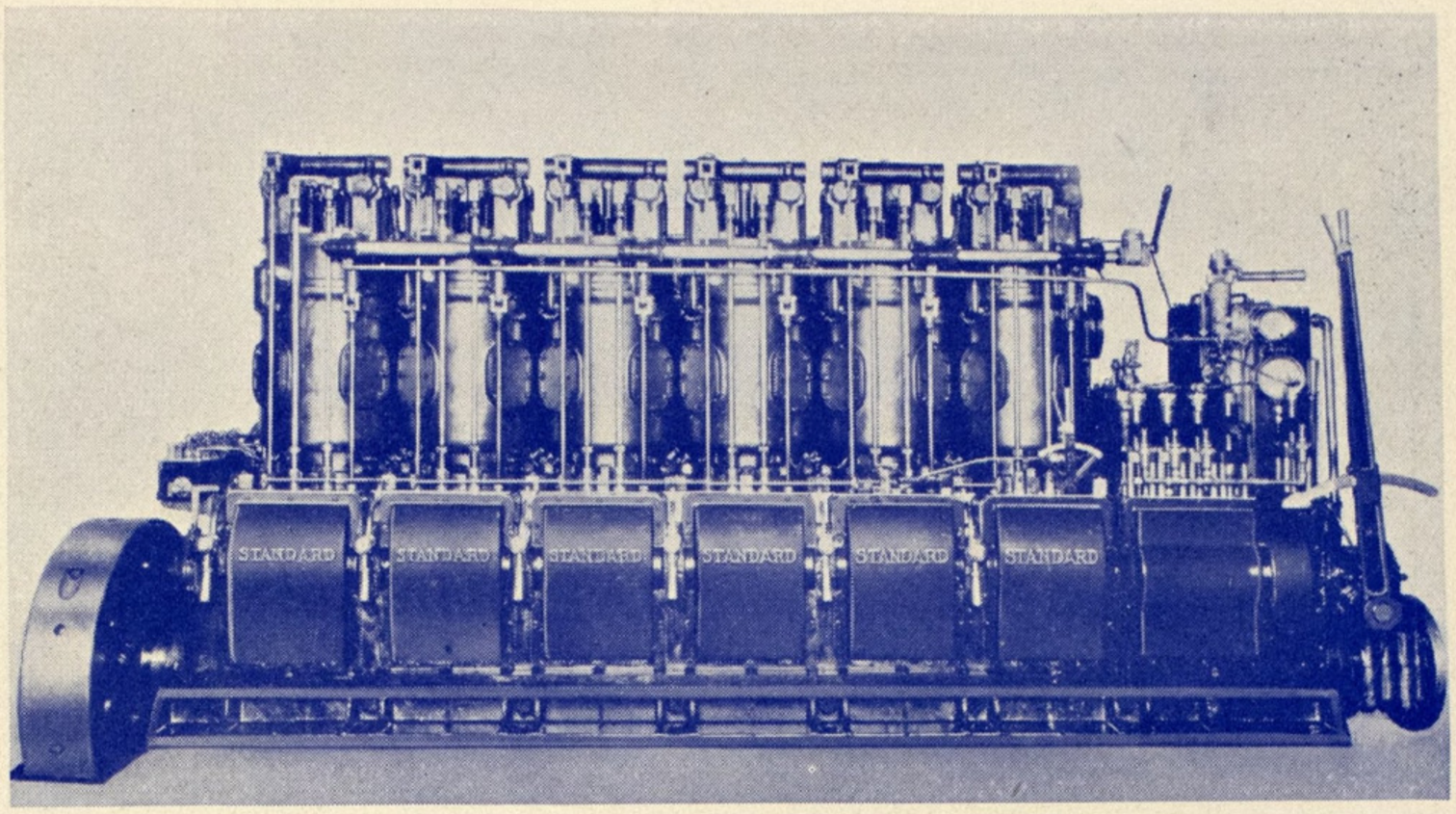
These large powerful railroad tugs exemplify modern marine engineering. There is a vast difference between the customary harbor towboat with coal burning scotch boiler delivering steam to a compound or triple expansion steam engine and the power plant on the CLEVELAND and sister vessels where the motive power is supplied by two compact self-contained oil engines direct connected to generators which in turn supply current to an electric motor directly connected to the propeller.

Variation of propeller speed is possible for a wide range under exact control from the lowest to the highest speeds. Perfect maneuverability under all conditions is therefore assured, and so is full power at definite revolutions. With pilothouse control, the captain, from his vantage point has complete control of the motive power. No delay or dependence on signals to worry him in an emergency. He has instantaneous control in his own hands.

So powerful are these tugs that they have been dubbed "locomotives of the sea." Another important feature of these towboats is the fire-fighting equipment consisting of a three-stage fire pump with 500 gallons capacity.

Diesel Direct Drive in Freighter Red Star

Two Engines—Each 300 B.H.P.



DESCRIPTION

This vessel is powered with two four-cycle, six-cylinder, single acting, solid injection diesel engines of 300 brake horsepower each. The engines are direct reversing by shifting camshaft. Each engine has an attached air compressor for starting air only. There is also an auxiliary diesel driven air compressor.

Engine

Name of Engine—Standard diesel; **Year**—1931
Builder—Standard Motor Construction Co.
Cycle—4; **No. of Cylinders**—6; **B.H.P.**—300
Action—Single; **Injection**—Mechanical (solid)
Piston Coolg.—Air; **Bore**—11 in.; **Stroke**—15 in.
R.P.M.—350; **Piston Speed**—875 feet per minute
Pressure Brake—80 pounds per sq. inch (mean)
B.H.P. per Cyl.—50; **Mech. Efficiency**—85%
Stroke to Bore—1.36; **Wkg. Strokes per Rev.**—3
Length O.A.—14 feet 7⅞ inches
Height O.A.—6 ft. 10⅝ in.; **Width O.A.**—42 in.
Weight—26,400 lbs.; **Lbs. per B.H.P.**—88
Reversing—Direct by shifting camshaft
Air Compressor—Attached; starting air only

Vessel

Name—Red Star; **Type**—Diesel freighter
Owner—Victor Lynn Transportation Co.
Builder—Midland Barge Co., Midland, Pa.
Main Drive—Twin screw, diesel direct
Length B.P.—155 feet; **Beam**—31 ft. 11 in.
Depth—12 feet; **Draft**—9 feet
Speed—In knots, 11.5; **No. of Propellers**—Two
Fuel Consumption—Lb. per b.h.p. per h.—0.42
Generator—One 20 k.w. at 600 r.p.m. Diehl Mfg. Co. Direct connected on common sub-base to Standard diesel engine. Engine four-cylinder, six-inch bore by eight-inch stroke for driving generator also connected to 90 cu. ft. per min. air compressor.

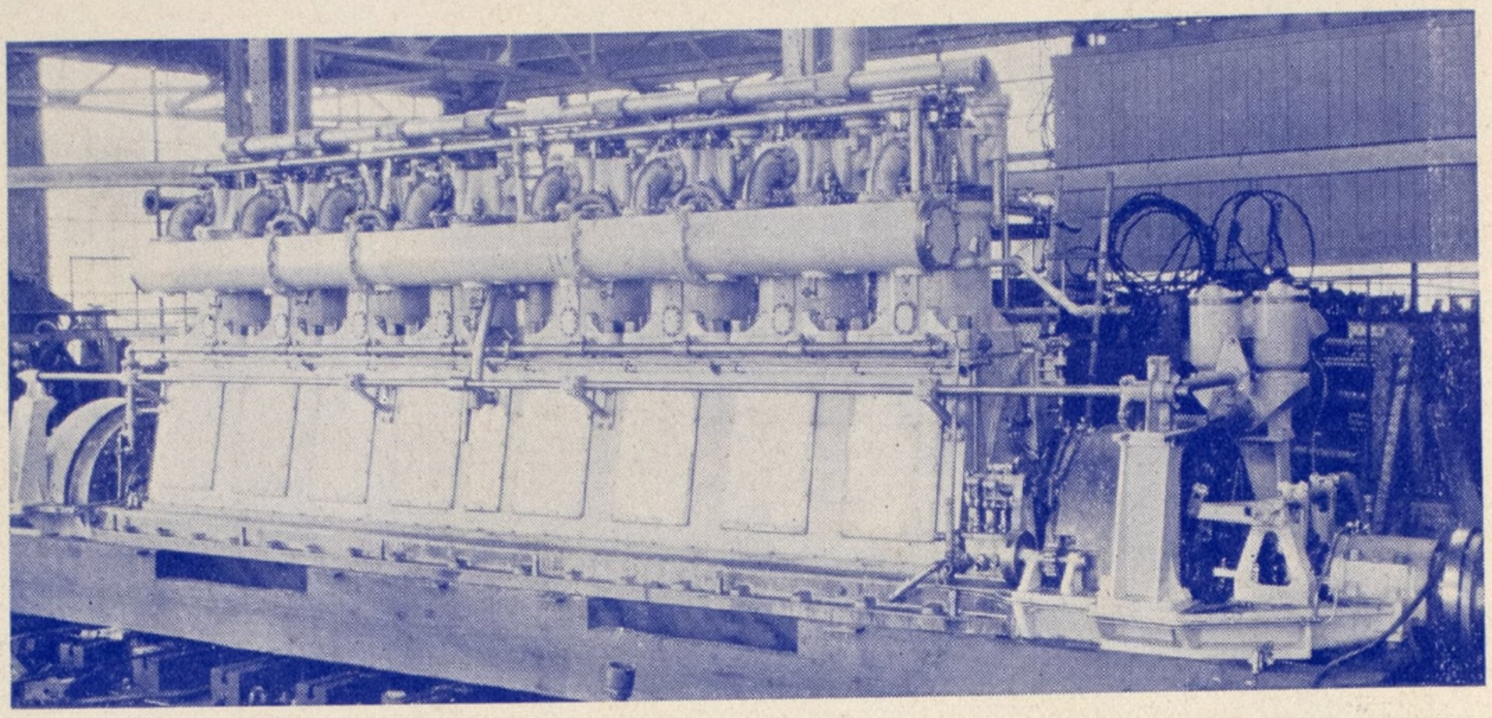
Remarks

This twin screw diesel freighter now in use on Chesapeake bay between Salisbury, Md. and Baltimore, was built in the interior at Midland, Pa. Delivery to the owner was made after a maiden voyage from the builder's plant via the Ohio and Mississippi rivers, Gulf of Mexico and Atlantic coast, a total distance of about 4000 miles, which in itself is rather an unusual performance. From Pittsburgh she carried a cargo of food products for delivery to river ports on the way. The trip from Pittsburgh to New Orleans, a distance of 2000 miles, is reported to have been made in less than seven days and the remainder of the voyage from New Orleans to Baltimore, about 2000 miles, in six days.

The Red Star is now in service with other vessels of the owner's fleet on Chesapeake bay in fast freight delivery to interior points around Baltimore by means of a coordinated trucking service. This is a happy illustration of a combination of efficient means of transportation for satisfactory service.

Diesel Direct Drive in Ferryboat Jersey Shore

One Engine—925 B.H.P.



Engine

Name of Engine—Washington; **Year**—1931
Builder—Washington Iron Works
Cycle—4; **No. of Cylinders**—8; **I.H.P.**—1075
B.H.P.—925; **Action**—Single; **Injection**—Solid
Scavenging—None; **Piston Cooling**—None
Bore—18 in.; **Stroke**—24 in.; **R.P.M.**—200
Piston Speed—800 f.p.m.; **Press. Ind.**—87.4 lbs.
Pressure Brake—75.1 lbs.; **B.H.P. per Cyl.**—116
I.H.P. per Cylinder—135; **Mechanical Eff.**—86%
Stroke to Bore—1.33; **Wkg. Str. per Rev.**—4
Lgth O.A.—41 ft. 6 in.; **Hght. O.A.**—12 ft. 9½ in.
Width Overall—6 ft. 7 in.; **Reversing**—None
Weight—189,625 lbs.; **Per B.H.P.**—205 lbs.

Vessel

Name—Jersey Shore; **Builder**—Pusey & Jones Corp.
Type—Double ended automobile ferry. Steel hull
Main Drive—One diesel engine direct connected
Length O.A.—206 ft.; **Beam O.A.**—58 feet
Depth—9 ft. 6 in.; **Speed**—13½ knots
No. of Propellers—Two, one at each end
Fuel Consumption—Lb. per b.h.p. per hr.—0.42; Lb. per i.h.p. per hr.—0.36
Capacity—75 automobiles

DESCRIPTION

This engine is of standard ferryboat type with a clutch at each end carried in an extension of the engine base. Reversing the vessel is accomplished by moving a control located at the operating stand of the engine. This control engages one clutch while disengaging the other, in one operation.

Remarks

This engine is non-reversing and drives a propeller at each end of the vessel by means of a one-way clutch and thrust bearing located at each end of the engine. The clutches are interconnected and operate through a single air control mechanism. Only one clutch is engaged at a time. When the vessel is under way the aft propeller does the driving and the forward wheel is free to turn without any drag and without throwing a retarding stream of water against the bow of the vessel. The vessel is moved in one direction by a right hand propeller and in the opposite direction by engaging a left hand propeller at the other end. The simplicity of this type of installation, and the positive reversing action secured makes it especially adapted for ferryboat service.

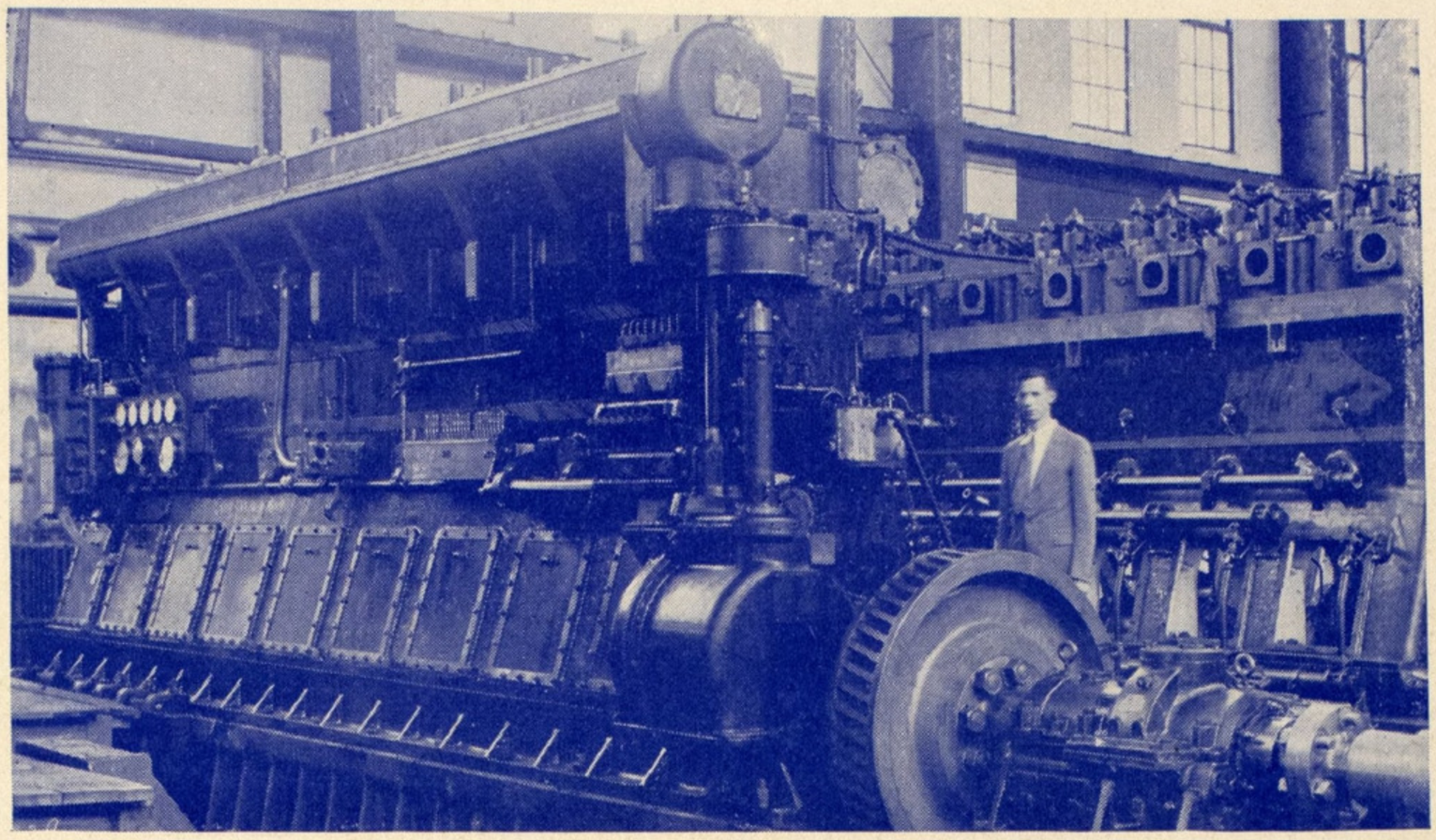
The ferryboat JERSEY SHORE was recently completed at the shipyard of Pusey & Jones Corp. The owner, the Delaware-New Jersey Ferry Co. installed the machinery, the work being done at the company's dock at Wilmington. This vessel is now in service on the route between Newcastle, Del. and Pennsville, N. J. Recent photographs show her loaded to capacity with automobiles. She is of steel construction and is said to be the first double clutch ferry on the Atlantic coast driven by a single non-reversing engine.

Diesel Direct Drive in Towboat Herbert Hoover

Two Engines—Each 1100 B.H.P.

DESCRIPTION

Two engines like the one illustrated and described here were installed, each direct connected to a propeller working in a partial tunnel. Each engine develops 1100 brake horsepower at 200 revolutions per minute. The engines are direct reversible and the engineer has complete control of both engines from one point. All maneuvering is done by two handles. The controls are so inter-locked that a false operation cannot be made.



Engine

Name—McIntosh & Seymour; **Year**—1931
Builder—McIntosh & Seymour Corp.
Cycle—Four; **No. of Cyls.**—8; **B.H.P.**—1100
Action—Single; **Injection**—Air; **No scavenging**
Piston Cooling—Oil cooling; **Bore**—20 in.
Stroke—24 inches; **R.P.M.**—200
Pist. Spd.—800 f.p.m.; **B.H.P. per Cyl.**—137.5
Stroke to Bore—1.2; **Wkg. Strokes per Rev.**—4
Reversing—Air; **Air Compressor**—Three stage

Vessel

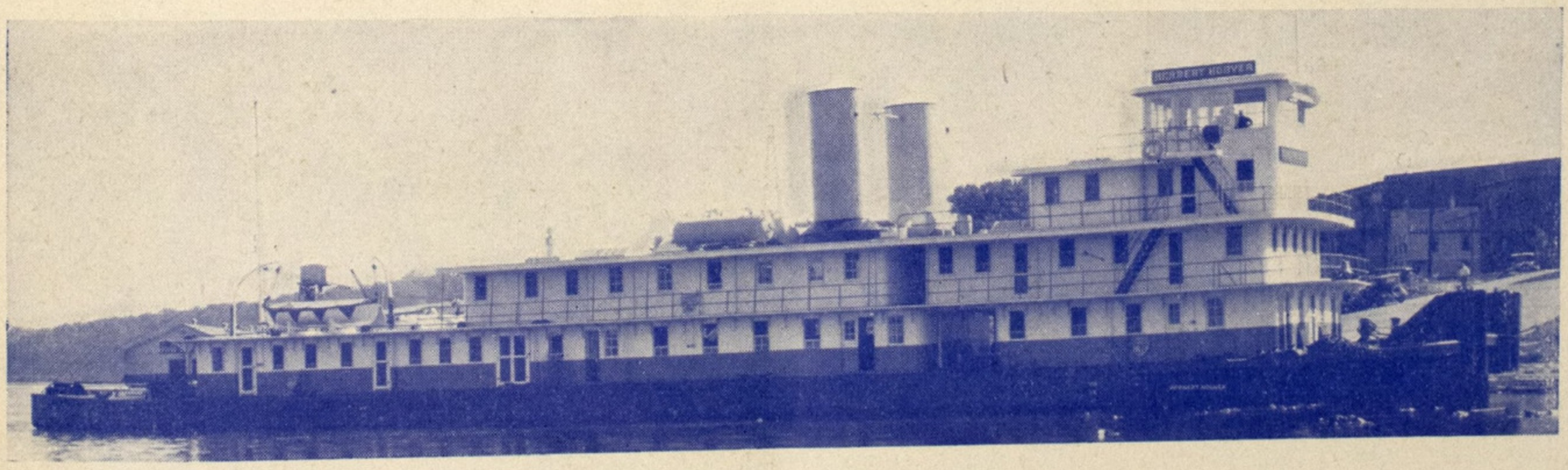
Name—Herbert Hoover
Owner—Inland Waterways Corp.
Builder—Dubuque Boat & Boiler Co.
Type—Twin screw, partial tunnel, river towboat
Completed—Trial trip Aug. 15, 1931
Main Drive—Two diesel engines direct connected
Length O.A.—226 ft. 4¾ in.; **Lgth. B.P.**—215 ft.
Beam—43 ft. 6 in.; **Depth**—10 ft.; **Draft**—6 ft.
Propellers—Two, 8 ft. dia. x 6 ft. 5 in. pitch
Fuel Capacity—150 tons of diesel oil
Fuel Consumption—Lb. per b.h.p. per hr.—0.41
Capacity—Towing upstream, 10,000 tons of freight, at average speed of over four miles

Remarks

The towboat HERBERT HOOVER, after successful trials, entered service of the Inland Waterways Corp. between New Orleans and St. Louis. Plans are under way for two similar towboats to be named HUCK FINN and TOM SAWYER. Designs for this powerful towboat were prepared by The Dravo Contracting Co. Each propeller works in a partial tunnel and is direct connected to the engine by a line shaft of 8 inches in diameter increasing to 8⅝ inches at the outboard bearing. The engines and shafts are arranged parallel. The engines are of trunk piston four-cycle, air injection type, each developing 1100 brake horsepower at 200 revolutions per minute. The maximum rating is 1300 brake horsepower at 230 revolutions per minute.

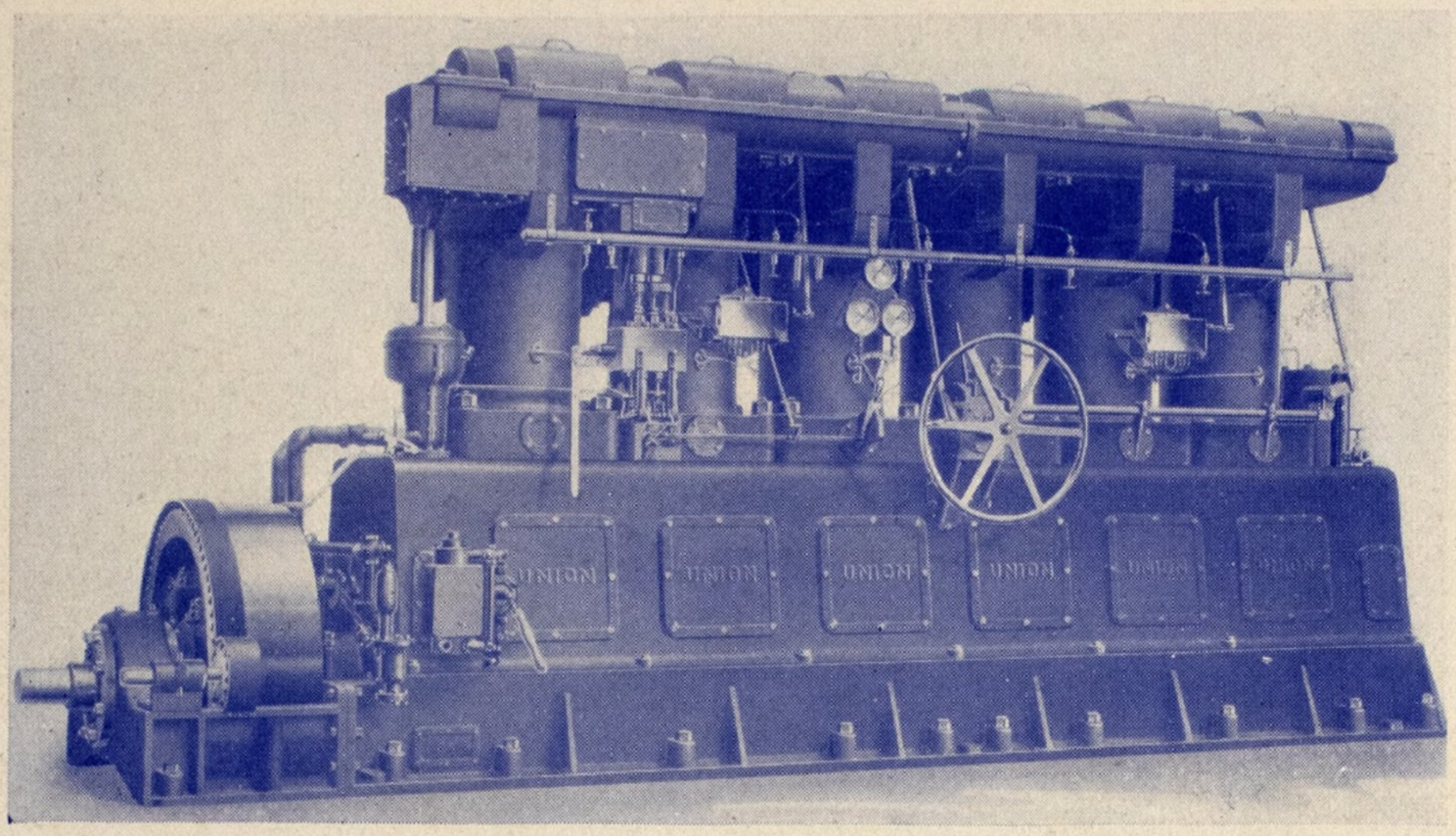
There are two Westinghouse generators each of 75 kilowatts, 125 volts, direct current driven by Atlas Imperial diesel engines.

This is one of the most powerful towboats ever built for river work with a maximum of 2600 horsepower available. See MARINE REVIEW for September.



Diesel Direct Drive in Clipper Mayflower

One Engine—550 B.H.P.



DESCRIPTION

Propelling power in the tuna clipper MAYFLOWER is one diesel engine described and illustrated on this page direct connected to the propeller. The engine is of four-cycle, six-cylinder patented mechanical injection, with overhead camshaft. There are individual cylinders with liners. All main operating parts are lubricated by means of a simple, easily installed, force-feed system.

Engine

Name of Engine—Union Diesel; **Year**—1931
Builder—Union Diesel Engine Co.
Cycle—4; **No. of Cylinders**—6; **B.H.P.**—550
I.H.P.—638; **Action**—Single acting
Injection—Solid; **Piston Cooling**—None
Bore—15½″; **Stroke**—20½″; **R.P.M.**—225
Piston Speed—770 feet per minute
Press. Indicated—100 lbs.; **Press. Brake**—80 lbs.
B.H.P. per Cyl.—91.7; **I.H.P. per Cyl.**—115
Mechanical Eff.—80%; **Stroke to Bore**—1.32
Working Strokes per Revolution—Three
Length O.A.—22 ft. 1⅜ in.; **Width O.A.**—5′ 6″
Height O.A.—10 ft. 5 in.; **Weight**—84,000 lbs.
Weight—Lbs. per b.h.p.—152; Per i.h.p.—132
Reversing—Direct, by sliding camshaft
Air Compressor—For starting air only

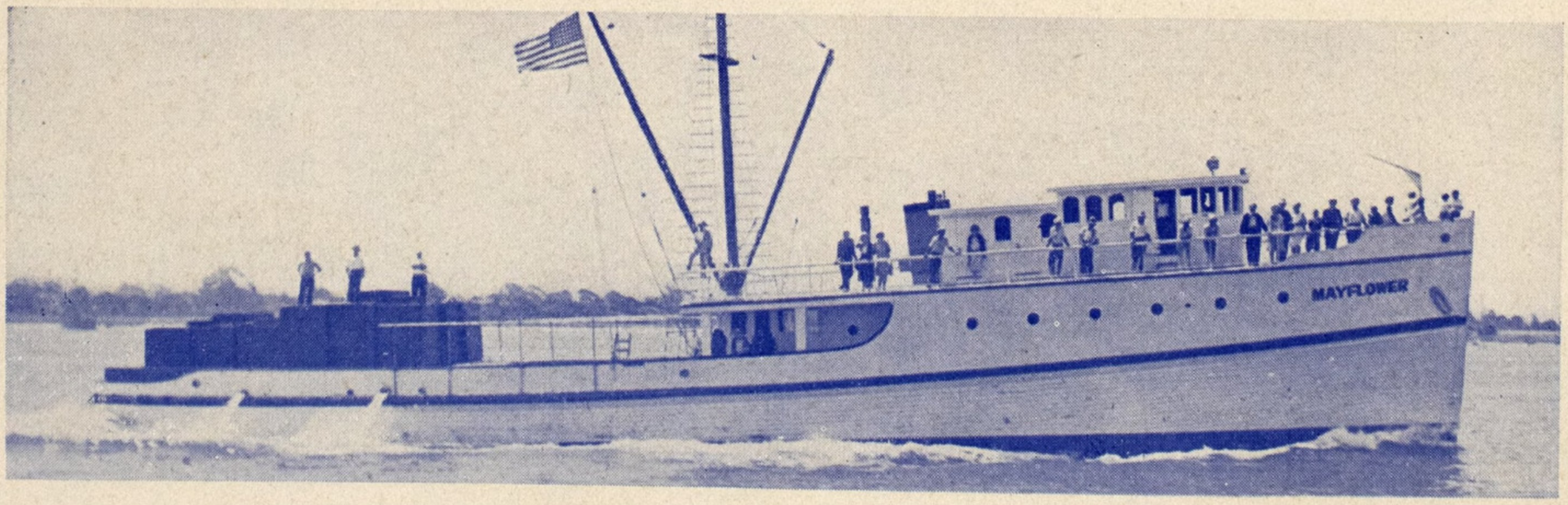
Vessel

Name—Mayflower; **Type**—Tuna clipper (fishing)
Owner—Mayflower Operating Co.
Builder—Campbell Machine Co., San Diego
Completed—Aug. 20, 1931
Type of Drive—Single screw, direct connected
Length B.P.—135′; **Beam**—28′; **Depth**—14′ 6″
No. of Propellers—One; **Speed**—In knots, 12
Fuel Capacity—In bunkers, 550 bbls. or 77 tons
Fuel Consumption—Lb. per b.h.p. per hr.—0.42 Lb. per i.h.p. per hr.—0.33; tons per day at 11 knots, about 5800 lbs.
Radius Without Refueling—10,000 miles
Generators—Two Westinghouse; one 52 k.w. at 340 r.p.m. direct driven by three-cylinder Union diesel engine; one 50 k.w. direct current at 350 r.p.m. driven by belt from main engine

Remarks

In the design of this vessel the owner incorporated his wide experience with large off-shore fishing vessels. The MAYFLOWER represents a development of a type especially suitable for tuna fishing with live bait on the fishing grounds in the Pacific ocean off Central and South America. She is the largest of all the fishing clippers and cost about $125,000. She has a fish carrying capacity of 250 tons.

The distances covered in tuna fishing vary from 400 miles off San Diego to points as far away as the Galapagos group south of the equator off the South American coast. Off from shipping lanes it is essential for the safety of the crew and ship that the machinery is dependable and self-contained.

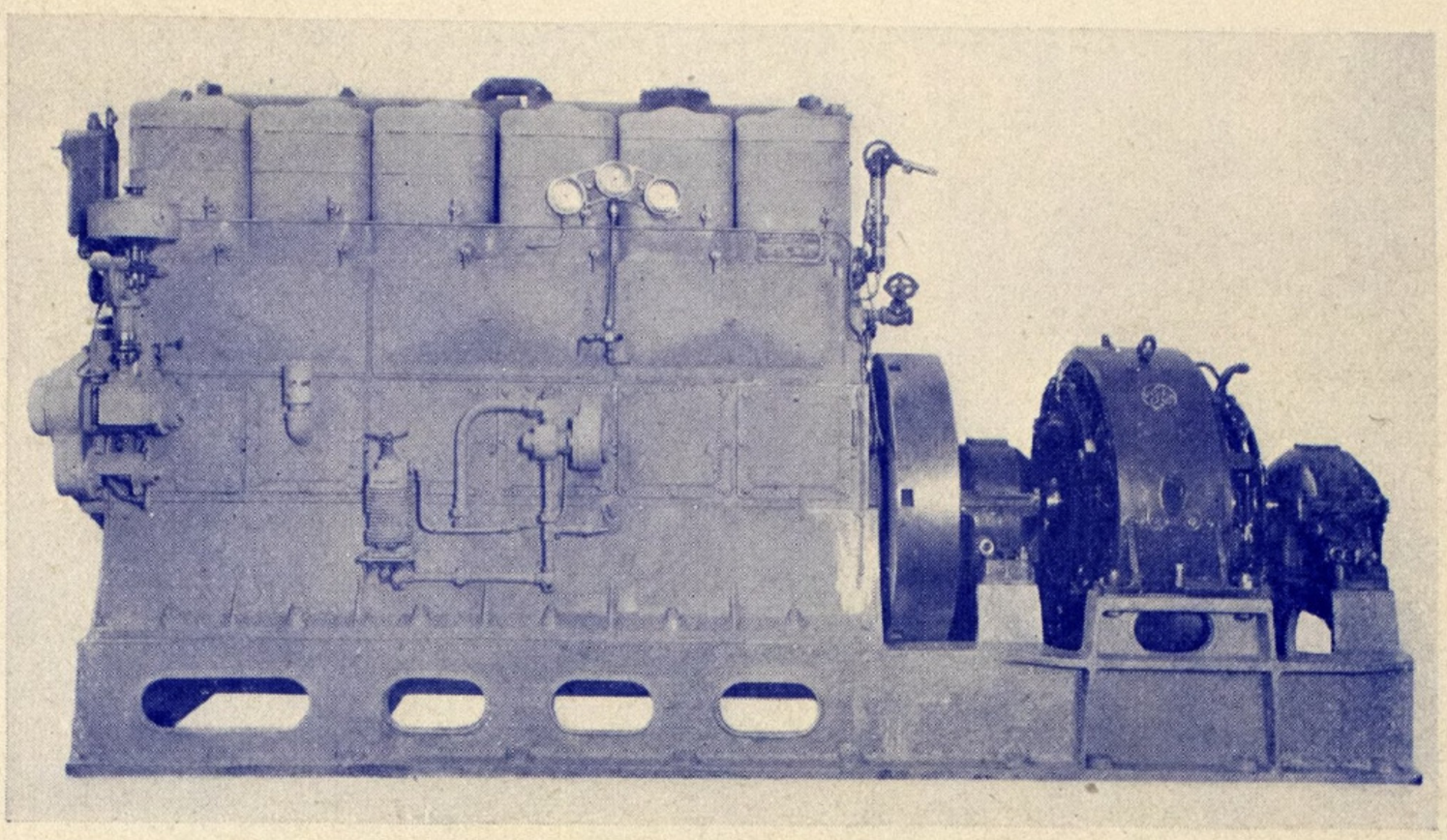


Diesel Electric Drive in Tender Columbine

Two Engines—Each 200 B.H.P.

DESCRIPTION

The propulsion power is by one electric motor direct connected to the propeller. Electrical current is generated by two generating sets, each driven by one diesel engine described and illustrated on this page. The engine is of block type of construction with removable cylinder liners. It has the engine builder's constant pressure fuel system.



Engine

Name of Engine—Atlas Imperial; **Year**—1931
Builder—Atlas Imperial Diesel Engine Co.
Cycle—Four; **No. of Cylinders**—6; **B.H.P.**—200
Action—Single; **Injection**—Solid (Mechanical)
Piston Coolg.—Air; **Bore**—9 in.; **Stroke**—10½"
R.P.M.—500; **Piston Speed**—875 feet per min.
Pressure Brake—80; **B.H.P. per Cyl.**—33.3
Stroke to Bore—1.17; **Wkg. Str. per Rev.**—3
Length O.A.—15 feet; **Height O.A.**—7 ft. 7 in.
Width O.A.—3 ft. 8 in.; **Weight**—13,600 lbs.
Weight—One engine and generator, 24,000 lbs.
Air Compressor—For maneuvering only

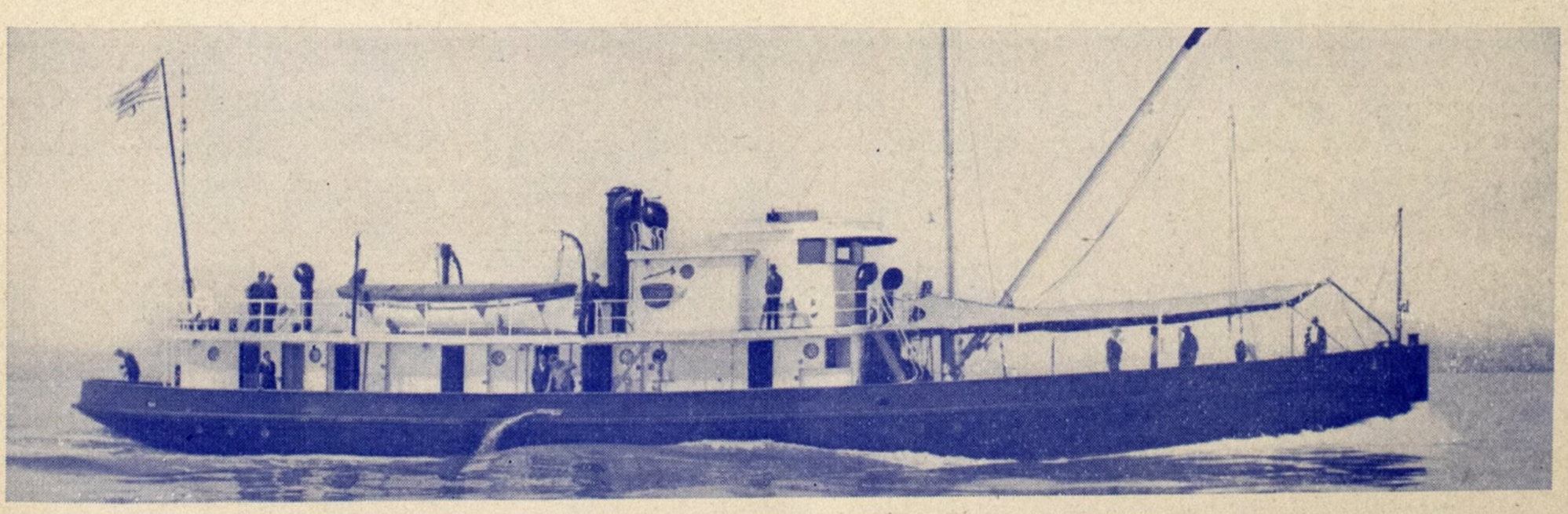
Vessel

Name—Columbine; **Type**—Lighthouse Tender
Owner—United States Lighthouse Service
Builder—The Moore Dry Dock Co.
Main Drive—Single screw diesel electric
Completed—October 1931
Length B.P.—111 ft. 8 in.; **Beam**—25 feet
Depth—9 feet; **Draft**—5 feet 11½ in.
Displ.—265 tons; **Deadweight**—55 tons
Speed—In knots, 9½; **No. of Propellers**—One
Fuel Capacity—Bunkers, 82 bbls.; or 10½ tons
Fuel Consumption—Lb. per b.h.p. per hr.—0.45
Radius Without Refueling—1500 nautical miles
Generators—Two main General Electric generators, each 100 k.w. at 500 r.p.m. direct connected to the diesel engine described.
Propelling Motor—One General Electric propelling motor of 240 h.p., 500 volts at 350 r.p.m. direct connected to propeller. The motor is of double unit construction. Electrical equipment throughout supplied by the General Electric Co.

Remarks

The single screw electrically propelled Lighthouse Tender COLUMBINE is a sister ship of the LINDEN and is now in use by the bureau of lighthouses of the department of commerce in buoy and supply work on the Pacific coast. Successful trials were held on Sept. 30, 1931.

The COLUMBINE is of steel construction. The main electric generators, which are diesel driven, supply electricity for all purposes including propulsion, lighting and the operation of auxiliaries. Control is of the armature type with a station in the engine room.



S. S. President Coolidge, second $8,000,000 *Liner built at Newport News for the Dollar Lines, Passing Cape Henry, Va.*

Main Machinery and Auxiliaries on the S. S. President Coolidge

By H. C. Coleman

WHEN the plans for the new Dollar liner PRESIDENT COOLIDGE were being formulated, a careful study was made by the owner of various types of propulsion and auxiliary machinery available for such a vessel. After a thorough analysis and complete consideration of all factors involved for the trade route over which the ship was to operate, it was decided to use turbine electric propulsion and electric auxiliaries.

The vessel is driven by 26,500 shaft horsepower twin screw Westinghouse turbine electric machinery and the electric auxiliaries were also furnished by Westinghouse. The propulsion plant consists of two 13,250 horsepower synchronous motors coupled directly to the propeller shafts, two 15,000 horsepower steam turbines direct connected to two alternating current generators, and a control unit for these machines. The auxiliary power is supplied by four 500 kilowatts direct current geared turbine generator sets. This machinery is all located in one engine room which is amidship. This engine room has two levels. The propelling motors, main and auxiliary condensers with their pumps and other auxiliary pumps are located on the lower level. The main and auxiliary turbine generator sets and the propulsion control are on the upper level.

The author, H. C. Coleman, is manager, Marine Engineering, Westinghouse Electric & Mfg. Co.

THE S. S. President Coolidge is a sister ship of the S. S. President Hoover. The latter vessel was fully illustrated and described in the August issue of Marine Review. A report was also published on the exhaustive sea trials of the President Hoover. The sea trials of the President Coolidge were not as extensive but the performance was substantially the same. A brief comparison of performance will be given in a paper to be read at the coming meeting of the Society of Naval Architects and Marine Engineers.

Editor's Note

The main turbines are of the usual Westinghouse combined impulse and reaction type. The turbine and generator are connected by means of a solid coupling, thus forming a 3-bearing unit with two bearings on the turbine and one on the generator. Each part of the set rests directly on the foundation built into the ship structure. The turbine rotor is a solid annealed carbon steel forging. On this spindle are mounted 2 rows of impulse blades and 29 rows of stainless steel reaction blades.

The turbine cylinder is split horizontally and vertically, the high pressure section being made of cast steel and the low pressure section of cast iron. The cylinder carries one row of impulse blading and 29 rows of reaction blading.

Support for the turbine is located at three points, thus determining its position in a single plane and eliminating possible distortion of the cylinder. The turbine is provided with four nozzle blocks, each containing a number of nozzles.

Where the rotor shaft passes

through the turbine casing, glands are provided to prevent steam leaking out or air entering. These glands are of the combined steam and water sealed type. The water sealing is effective at all speeds above ¼ speed.

Sensitive Hydraulic Type Governor

The steam chest is of the 4-valve automatic type. The valves themselves are of the double seated poppet type mounted in parallel with the chest. These valves are connected to the governor operating pistons by means of a linkage. The secondary, tertiary and quaternary valve operating levers are provided with a tension spring which holds its adjacent valve closed until the preceding valve has been fully opened. The governor which operates the above valves is of the oil operated type and depends for its operation on the variation in oil pressure produced by changes in speed of an oil impeller which is mounted on the turbine shaft. This makes a very sensitive and quick acting governing system.

In the governor layout there is provided an oil pressure relay which is connected through a small pipe to a control valve on the main control board. From this control valve a drain pipe is led to the oil reservoir. By changing the opening of this valve in the relay line the pressure on top of the relay may be adjusted, which means that the turbine can be set for operation at any speed from ¼ to full speed and still be under the control of the governor at all times.

At the forward or high pressure end of the turbine is mounted an automatic stop governor. This device is arranged so that it will function to cause the throttle valve to close and shut down the turbine in case of excessive speed or in case of damage due to failure of the thrust bearing resulting in axial movement of the spindle. The throttle valve is of the oil operated spring closed type, arranged to be held open by oil pressure. Thus, in case of failure of oil supply to the turbine, the throttle valve is automatically closed, shutting off the steam.

Each Generator, 10,200 Kilowatts

Each of the two main generators is rated at 10,200 kilowatts, 4000 volts, 2660 revolutions per minute and is of the three phase, two pole type. The generator is similar in construction to the usual land type except of somewhat different proportions. This is necessary in order to provide for the special characteristics required for ship propulsion which include such items as high inherent stability, large thermal capacity and operating below critical speed.

In the generator frame construction, structural steel shapes are used throughout. These shapes are welded into form to give a very rigid frame of minimum weight. An unusual arrangement has been provided in that an opening is arranged at the top of the frame, this being normally covered but which can be opened to permit cooling air to discharge directly into the engine room in case the water cooler in the closed ventilating system should become inoperative.

The stator core is made up of the best grade of segmentary steel laminations, there being six segments per circle. Throughout the core, H-shaped spacers are used approximately every two inches to provide passages for ventilating air.

Each end of the machine is provided with two end bells made from sheet steel, welded. The inner end bells enclose the stator end windings, while the outer bell provides the air space for directing the ventilating air. Labyrinth sealing glands are provided in the outer end bells to prevent leakage of the ventilating air, since the machine is arranged with a complete closed ventilating system. Fans mounted on the generator rotor circulate air through machine and through coolers mounted just below the generator foundation. This arrangement of cooling eliminates the necessity for large ventilating ducts on the ship and reduces to a minimum the noise which usually results from air circulation in a high speed machine.

Capt. K. A. Ahlin
Commander of the S. S. President Coolidge

The generator rotor is made from a one piece solid steel forging. Radial slots are machined in this forging to receive the field winding. As this rotor is of the ventilated type, additional grooves are cut below the coil slots to form air passages. Also, holes are drilled through the rotor teeth so that air can flow radially from the ventilation under the windings.

The rotor winding consists of flat copper strap insulated from the slots with molded mica cells, and with built-up mica insulation between turns.

A single entrance centrifugal type fan is mounted on each end of the rotor, this fan being bolted to the rotor end plate.

The collector rings are made from high grade tool steel and are mounted on an extension of the rotor shaft, outside the generator bearing. The brushes are carried in holders fastened to a supporting ring which is mounted on the outboard end of the bearing pedestal. This entire collector ring and brush assembly is enclosed by a cast aluminum cover.

For convenient measurement of stator temperatures, nine resistance coils are embedded in the armature winding and located so as to give the highest temperature obtained in operation.

In order to protect against damage by fire, the generator is provided with sprinkler pipes in the end bells, opposite the air gap. These pipes are connected up to a fresh water system with valves arranged for emergency use.

Electric heaters are installed underneath the stator end windings to prevent moisture from collecting during idle periods. There are two 750-watt heaters at each end of the machine.

Synchronous Propulsion Motors

The propelling motors are of the synchronous type, each rated 13,250 horsepower. They have 40 field poles, thus giving a speed reduction ratio of 20 to 1 between the main turbine and the propeller shaft. Thus the normal motor speed at full power is 133 revolutions per minute.

The motors are of the self-contained two-bearing bracket type. The rotor is supported by two bearings, each being carried in a steel bracket which fits into a recess in the frame to which it is bolted. These motors are of the entirely fabricated type built up from steel plates and shapes by welding, the only castings used being the bearing housings and shells.

These are the first synchronous motors for ship propulsion of such large capacity to be built with fabricated rotor spiders. The design of spider worked out for this installation resulted in an extremely strong construction with uniform stress distribution and with minimum weight.

Each motor is separately ventilated by means of a motor driven propeller type blower which is mounted directly in the air passage duct in the engine room trunk. This blower is arranged so that it forms a part of the duct, thus requiring no foundation and insuring the minimum amount of space required as well as providing a very efficient blower. The driving motor is of the vertical type and mounted just below the blower unit. The ventilating aid for the motors is taken out of the engine room and exhausted through the after funnel.

The motor stator frame is of the rigid box section type, welded from steel plates with an opening at the top for discharging the ventilating air. The stator core is built up of steel laminations of the best grade, there being 20 segments for a complete circle of punchings. Vent spacers are provided every 2 inches through the core width.

The bearings are of the sleeve, oil ring type having two rings per bearing. Special features are provided on these bearings to permit operation with permanent inclination at 15 degrees either laterally or longitudinally. In addition to the ring oiling system the bearings are also supplied with forced feed lubrication from the ship's gravity oiling system. All bearings are provided with illuminated side flow indicators and thermometers in the discharge oil line.

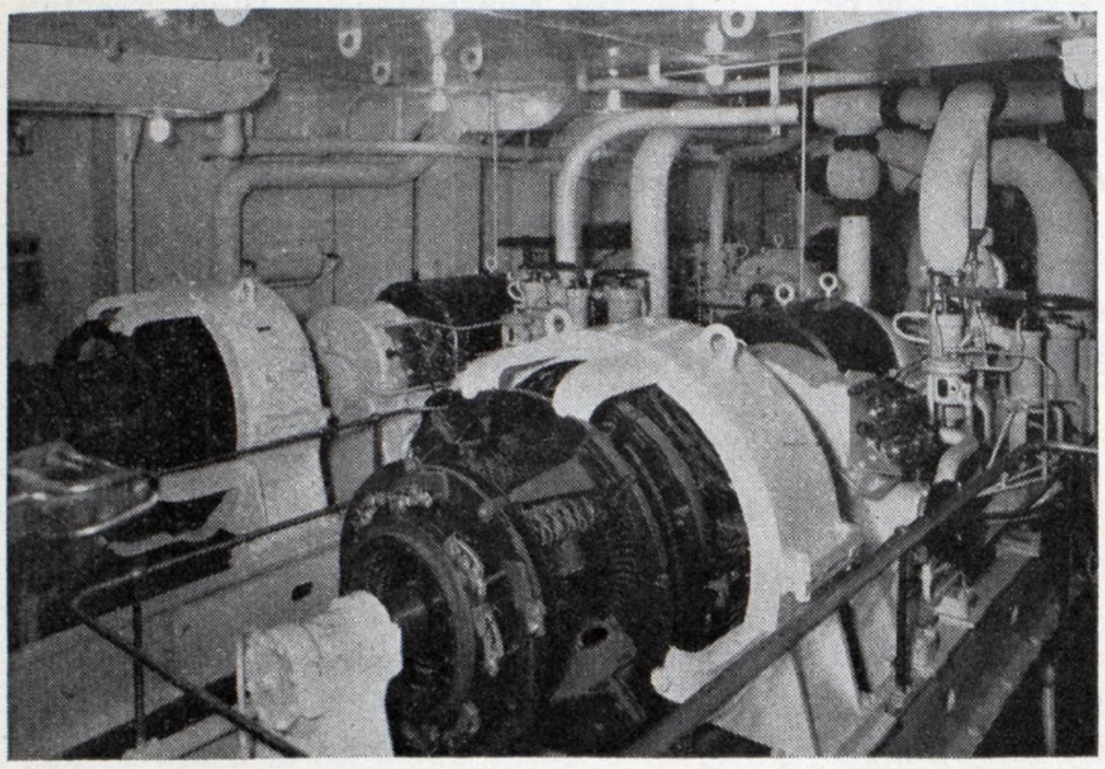
The propulsion control equipment is mounted at the after end of the upper engine room level, on the same level as the turbine generator sets. This equipment is divided into two compartments, all surrounded by a protecting metal screen. The after compartment contains all of the high voltage control devices. The forward compartment contains the low voltage control devices such as are required for field and control circuits.

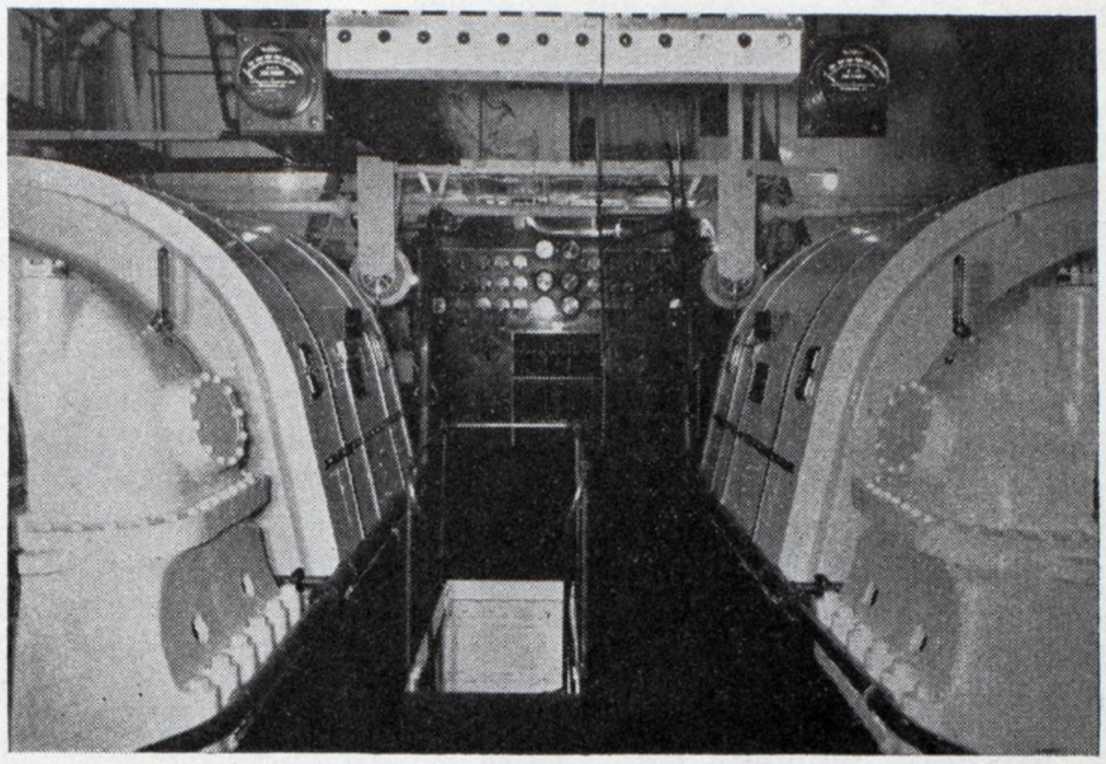
In the after compartment are mounted the two large switch groups which carry the main switches in the circuit between the propelling motor and generator stators. The purpose of these switches is for reversing phases of the primary circuits to effect reversal of direction of operation of the propelling motors. These are 1500 ampere, 4000 volt manually operated air break switches. This compartment also contains the necessary current and potential transformers and the changeover switch, which is used to make proper connections for operating both motors from either generator alone. The access door to this compartment is provided with an interlock connected in the trip circuit of the generator field circuit breaker. Thus, it is impossible for an operator to open this access door and enter the compartment while any of the parts are alive, because the interlock, which is operated when the door is opened, serves to trip the field circuit breaker and thus remove voltage from the generator.

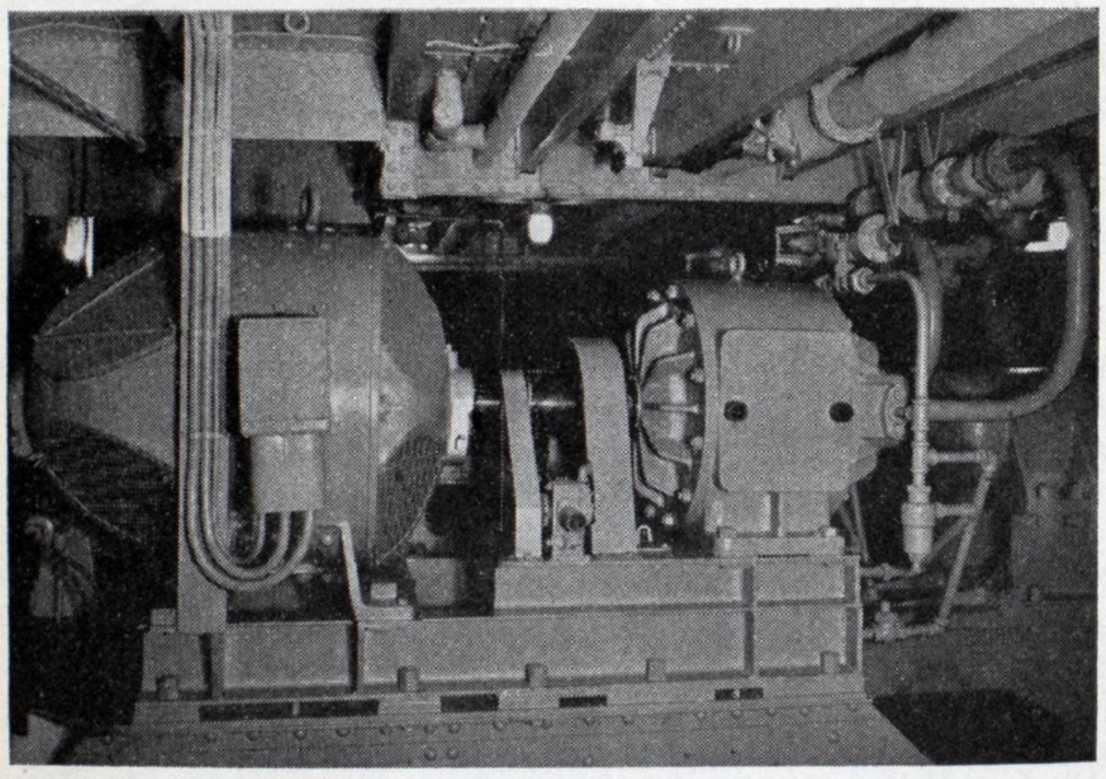
In the low voltage compartment are mounted the switch groups carrying the manually operated contactors for making the necessary motor and generator field connections.

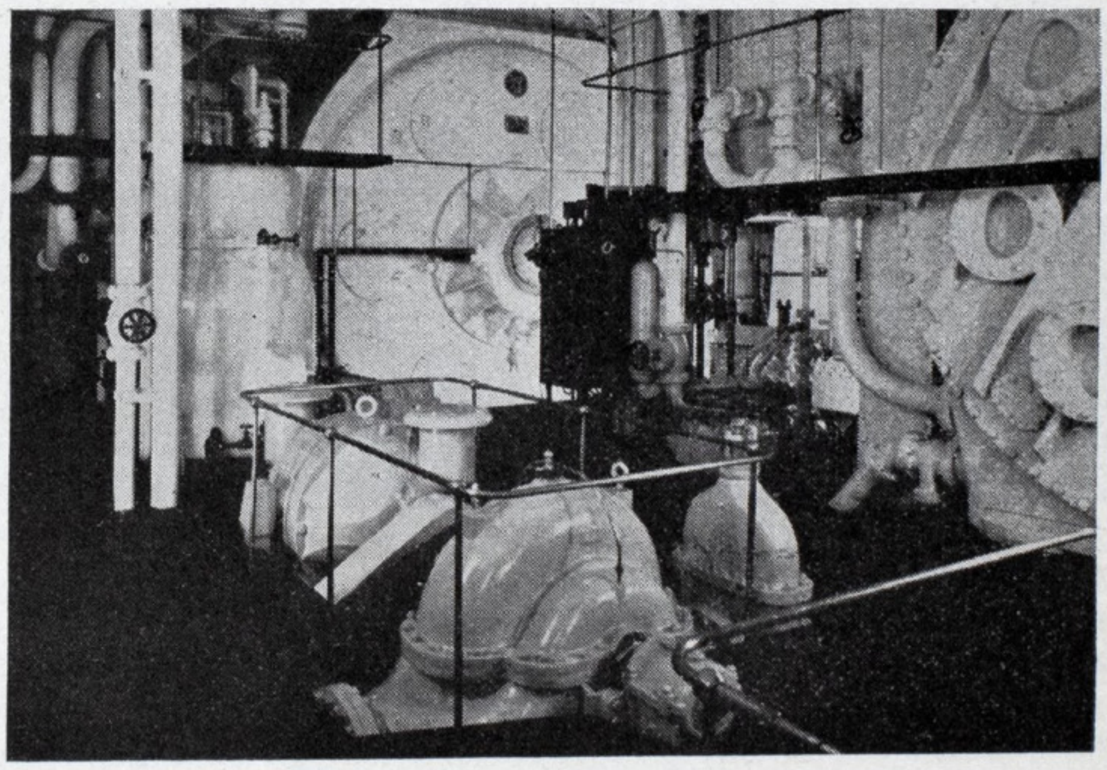
The field and reversing switches are operated from levers mounted in a control desk which is made a part of the front panel of the control assembly. This desk carries seven levers, two for adjusting the speed of the two turbines, two for operating the port and starboard field switches and two for operating the corresponding reversing switches. The center lever operates the changeover switch. This arrangement of changeover is a departure from former practice. With the ship operating on both main units the control levers on both sides can be brought to the "off" position, which will allow the changeover lever to be thrown to either the port or starboard generator, after which the motors can again be started, taking power from the single generator. This complete changeover in set-up connections can be made in less than one minute's time.

Another important departure in the control layout has been the incorporation of both the main generator and propelling motor field rheostats for one side of the ship in a single frame and with face plate contact arms geared to one operating hand wheel









S. S. President Coolidge, Machinery Built by Westinghouse Electric & Mfg. Co. Upper Left—Four 500 K. W. Auxiliary Turbine Generating Sets. Upper Right—Two Main Turbine Generator Sets, each of 10,200 K. W. Lower Left—American Engineering Co. Electrohydraulic Steering Gear with 75 H. P. Motor Drive. Lower Right—One of the 13,250 H. P. Main Propulsion Motors, Starboard Side

on the control board. Furthermore, the control is arranged so that for single generator operation the port and starboard generator and motor field rheostats are clutched together by a simple device mounted above the control levers so that both sets of rheostats are operated from one hand wheel, on the side of the board which is being used in single generator operation. The control levers are ingeniously interlocked so that it is impossible to improperly operate them.

The panel above the control desk carries all the necessary electrical instruments as well as steam pressure and vacuum gages for the complete record of the operation of the propulsion plant. This panel also carries phase balance relays which are used to protect the generators and motors against unbalanced conditions, such as would be caused by a ground. In this case, these relays function to open the generator field breaker. The control panel also carries temperature indicators to measure the temperature of the generator rotors and the nine temperature indicating coils in each main generator stator and corresponding six coils in each motor stator. On each side there is also a triplex ground detector voltmeter to indicate grounds on any phase.

Auxiliary Turbine Generators

On a vessel carrying 1200 people a great deal of power is necessary for supplying the hotel requirements. The PRESIDENT COOLIDGE has four 500-kilowatt geared turbine generator sets which are used to supply power for all auxiliary electrical load in addition to that necessary for excitation of the main generator and motor fields. Under normal conditions, two of these generating sets will supply sufficient power for all purposes. Under peak load conditions, such as at meal time and when operating in the tropics and with a large refrigeration load, three generating sets will be in operation. This always leaves one unit as a spare.

Like the main turbines, the turbines driving the auxiliary generators are of the combined impulse and reaction type, and are very similar in construction. The forged rotor spindle carries two rows of impulse blading and 18 rows of reaction blading. The cylinder carries one row of impulse blades and the same number of rows of reaction blades as the rotor. The gear end of the turbine casing is supported by the gear case and the exhaust end by a plate which is bolted to the cylinder and the structural steel bedplate. The turbine rotor is carried in two bearings and is provided with a Kingsbury thrust bearing. Glands of the labyrinth and water sealed type are provided at both ends of the casing.

Each turbine is provided with a primary and secondary valve mounted in the steam chest proper and a tertiary valve mounted separately. The throttle valve is of the quick spring closing type and is held open by high pressure oil. Protective devices incorporated in the turbine design include an automatic over speed stop which automatically shuts the turbine down if the speed rises to about 12 per cent above normal. There is also an oil over pressure trip which closes the throttle valve if, due to over speed, the impeller discharge pressure exceeds a predetermined value.

Generators of Complete Welded Type

The auxiliary generators are compound wound and each rated at 500 kilowatts, 240 volts, 1200 revolutions per minute. They are limited 3-wire machines providing 120-volt power for normal excitation of the propulsion generator fields. Balance coils are used to obtain the 120 volts between the neutral and positive or negative leads. The generators are of the rugged marine type with rolled steel frames and are of the complete welded type resulting in a very compact machine with minimum weight and uniform magnetic circuit.

The four auxiliary generating units which are mounted on structural steel bedplates are located on a flat on the port side of the upper engine room level. The auxiliary switchboard for controlling these generating units is mounted at the after end of this space. This board also carries the necessary feeder switches for the ship's auxiliaries as well as control for two 300-ampere balancer sets which supply 115-volt power for the lighting circuits. Each balancer set consists of two compound wound direct current 120-volt machines coupled together and mounted on a bedplate.

The propelling machinery for any vessel is the item of prime interest when studying the machinery installation. However, on a large combined passenger and cargo vessel like the PRESIDENT COOLIDGE, we must not lose sight of the fact that the satisfactory operation of the ship as well as the comfort and service to the passengers required a large number of auxilaries. Suitable provision must be made for loading and unloading the cargo.

In considering the deck machinery installation the most important item from the standpoint of power requirement is the cargo winch-layout. There are six cargo holds, five being reached through deck hatches and the sixth through side ports. Serving these cargo holds are 18 Lidgerwood single geared, single drum winches designed for a duty of 3000 pounds at 340 feet per minute rope speed. Each winch is driven by a 35-horsepower waterproof motor. In addition there are two reversible Lidgerwood compound geared single drum winches serving a 30-ton boom located at the forward hold. Each of these winches is also driven by a 35-horsepower waterproof motor. The winch motors are operated by control of the magnetic type with the contactor panels and resistors mounted in a control house which is built around each mast. The controls are operated by means of waterproof pedestal type master switches located near the hatches so that the operator has full vision of all operations. Each winch is also provided with a shoe type solenoid brake with water-proof coil.

There are four double geared, single drum Lidgerwood winches mounted at the 'tween deck hatches of No. 3 hold. These winches are driven by 25 horsepower water-proof Westinghouse motors and the winches have a duty rating of 3000 pounds at 175 feet per minute.

On the forward deck there are two Hyde automobile capstans. These capstans are used to load automobiles through the side ports. Each capstan is driven by a 15 horsepower 800 revolutions per minute motor.

On the shelter deck aft, three American Engineering Co. electric capstans are installed. Each capstan is driven by a 75 horsepower 500 revolutions per minute, water-proof motor, the motor and gearing being mounted on one bedplate and each unit, together with the solenoid brake and control equipment is mounted in a separate compartment below deck.

On the boat deck there are six sets of Welin-McLachlan gravity type davits. These davits are motor driven for raising the lifeboats, there being six 15½ horsepower, 875 revolutions per minute motors for this purpose, provided with drum type manual controllers. There are also two large boat winches, each driven by a 25 horsepower, 550 revolutions per minute water-proof motor.

Five Controls for Steering Engine

The steering gear made by the American Engineering Co. consists of two pairs of hydraulic cylinders, each pair operating one double plunger. At its center each of the plungers carries a wrist pin connected by steel link rods to the cross head on the rudder stock. The cylinders are served by duplicate Hele-Shaw variable stroke delivery pumps, each driven by a 75 horsepower 580 revolutions per minute motor. Five separate controls are provided for this steering engine including hydraulic telemotor from the wheel house, from a wheel on top of the wheel house, from hand or automatic steering by Sperry gyro-pilot in the wheel house, by direct connection from a wheel in the steering room, and from shafting and gears from a wheel in the after steering station on the bridge deck.

The PRESIDENT COOLIDGE has a refrigerated cargo space of approximately 70,000 cubic feet and the ship's cold storage rooms have a space of approximately 20,000 cubic feet. Slightly over half of the cargo space is cooled by circulation of refrigerated air. Each compartment is provided with a motor-driven cargo cooling fan which circulates air over cooling coils through

which brine is circulated. The remainder of the cargo space and the ship's cold storage space is refrigerated by circulation of brine in coils in the rooms. To take care of this refrigeration load there are four Brunswick-Kroeschell vertical 3-cylinder single acting carbon dioxide compressors, each driven by a 100 horsepower 320 revolutions per minute motor. There are four carbon dioxide condensers and four brine coolers. For circulating the brine through the cooling coils there are three 3-inch motor-driven Warren pumps. There is also a small motor-driven brine circulating pump for the ship's cold storage rooms and a 1½ horsepower drinking water circulating pump. The refrigeration plant also supplies the ice service.

Ventilation in connection with the public rooms, state rooms, crew's quarters and machinery spaces requires 39 motor-driven Sturtevant blowers for hull ventilation, all located on the weather decks. The four largest blowers supply 120,000 cubic feet of air per minute to the engine room. Two large blowers are required for exhausting air from the gallery. The power requirements for these various blowers range from 10 horsepower to ¼ horsepower.

In addition to the hull ventilation, forced draft is required for the boiler rooms and four 20 horsepower motor driven fans are located directly in the boiler rooms for this purpose. Other important auxiliaries located below deck, chiefly in the engine room include four 115 horsepower main condenser circulating pumps, three 15 horsepower main condenser condensate pumps, two 30 horsepower auxiliary condenser circulating pumps, three 5 horsepower auxiliary condensor condensate pumps, two 11 horsepower fuel oil service pumps, two 45 horsepower fire and sanitary pumps, two 7½ horsepower sewage pumps, one 25 horsepower ballast pump. All these pumps were made by Warren Steam Pump Co. There are also two 10 horsepower shaft turning motors, one 85 horsepower air compressor and two 25 horsepower propelling motor blowers.

In general, the below deck motors supplied on the PRESIDENT COOLIDGE by Westinghouse are of the drip-proof self-ventilated marine type. The deck motors are all of the water-proof type built for heavy duty intermittent service, excepting of course, the hull ventilation blowers where continuous duty motors are applied.

The control equipment for the engine room auxilaries is, in general, of the magnetic contactor type enclosed in drip proof cabinets with pushbutton control stations mounted near the motors. Control for the deck applications such as cargo winches and capstans is of the magnetic type with water-proof master switches mounted on deck and the other control devices enclosed in deck houses. Control for the hull ventilation motors is of the same type as the below deck motors.

To add to the comfort of the passengers and the crew, an elaborate installation of electric state room fans and heaters has been made on the PRESIDENT COOLIDGE. Those units have been finished in such a way as to match the decorations of the public rooms and staterooms in which they are mounted.

Ships in Distress Should Radio Accurately

A recent circular issued by Admiral F. C. Billard, commandant of the United States coast guard, contains specific information regarding the proper procedure of a vessel in distress which should be in the possession of everyone concerned with the safety of life and property at sea. The coast guard service, maintained by the government and available without charge, responds promptly for assistance as far as the distribution and condition of its facilities permit. Observance of the following suggestions, contained in the circular, will greatly aid the coast guard in its work and mariners are urged to abide by this procedure:

"Vessels equipped with radio requiring assistance may obtain the services of the coast guard by transmitting a request on the international distress and calling frequency, 500 kilocycles (410 kilocycles on the Great Lakes), to "Any Coast Guard Unit" (Radio call NCU) or to any shore radio station addressed to "Coast Guard." Shore radio stations will forward to the Coast Guard all information regarding vessels requiring assistance unless such information is contained in a message specfically addressed elsewhere.

"If the following information is included in the original request for assistance it will place the responsible coast guard officer in a position to determine immediately the types and and number of vessels required to render adequate aid thus greatly facilitating the work of the coast guard and avoiding any unnecessary delay in the dispatching of assistance: Name, type and nationality of vessel; position, course, and speed (including drift); nature of trouble and condition of vessel, sea, and wind; number of persons on board; state whether or not coast guard assistance is requested.

"In cases of extreme emergency, when an SOS is broadcast, it is requested that the following procedure be followed by the vessel in distress: Approximately 10 minutes after transmission of the original distress message, transmit slowly, on the distress frequency, "MO" and own radio call for three minutes. This will enable coast guard vessels and stations in the vicinity to obtain direction finder bearings and accurately plot the position of the distressed vessel."

On the S. S. President Coolidge particular attention was given in the design to make certain that the cargo handling gear should operate with maximum efficiency. Stowing miscellaneous cargo through No. 6 Hatch. Electric drive winches with 35 H. P. motors arranged to give operator full view of hatch

Propeller Club Dinner

The annual dinner of the Propeller Club of the United States will be held in the roof garden of the new Waldorf-Astoria, New York, on Oct. 30. The dinner will be in charge of R. R. Piper and A. M. Tode.

Joseph W. Powell, president of the United Dry Docks Inc., will be the principal speaker.

Diesel Power and a Merchant Marine

Widespread Use Abroad Based on Lower Operating Cost—Only One Diesel Passenger-Cargo Ship Built in America in Five Years

By Edward B. Pollister

AT THIS critical time in world history, when the fate of nations is being gaged by the net loss or gain of their gold supply, this yard stick of national prosperity may well be applied anew in measuring the value of our new American merchant marine.

William W. Bates in his *American Navigation* published in 1902, refers to our net export of $1,366,755,000 in gold, silver coin and bullion during the 33 year period prior to 1896, as "a waste of wealth at once perfectly needless, absolutely dangerous and ruinously exhausting." Bates shows that our favorable balance of foreign trade of $1,203,945,992 for the period 1862-1896, inclusive, was more than offset by adverse transportation costs, paid to foreign vessels, which aggregated $2,878,518,913—leaving us poorer in gold by $1,674,572,921, the outflow of which contributed to the panic of the nineties.

Unless we carry in our own ships at least one-half of our foreign commerce, the nation must balance the cost of carrying the excess by exports of gold or its equivalent.

When we import goods in foreign bottoms, the freight becomes also an import. If imported in an American vessel, the loss in American wealth is limited to the purchase price of the goods in the foreign country of origin. When we sell goods in foreign markets, the freight, if paid to an American ship, is likewise an export; but if such freight is paid to a foreign ship it must be deducted from our exports to determine the true trade balance.

Commerce Important to Revenue

The increase in our foreign commerce and the rising cost of higher speed ocean transportation will play an ever increasing part in our national revenue, and the maintenance of a favorable balance in foreign trade, as well as in our national independence and security during war at home or abroad.

Further, ocean passenger fares and freight bills if paid to American shipping companies provide capital to continuously build new American ships, repair old American ships, pay American crews and purchase American supplies—a substantial industry of first importance in maintaining the full employment of our people and our capital. The bureau of the census reports 4,438,605 transportation employes in 1930. We are more familiar with the extent of employment depending upon land transportation, especially the railroads. The transportation of our foreign commerce is, likewise, a great industry, providing substantial employment throughout the country.

Ocean shipping is highly competitive and international in its scope. Its study, therefore, should embrace the marine activities of foreign nations, especially progress in modernization of ships to reduce transportation costs and increase speed. Unless we build equally modern, economical and fast ships, we cannot successfully compete. The outstanding marine engineering development of the past decade has been the widespread adoption abroad of the economical diesel engine for ship propulsion. In contrast, America continues almost exclusively with steam for commercial passenger and freight vessels, other than oil tankers. Unless the great majority of old sea-faring nations are wrong, America is rapidly losing ground in not dieselizing her ocean transportation to accomplish the purpose of carrying at least one-half of her foreign commerce. Lowest cost ocean transportation will eventually win out.

In sizes 6000-15,0000 tons which com-

This article was prepared for MARINE REVIEW at the request of the editor. The author, Edward B. Pollister, is president and general manager of Busch-Sulzer Bros. Diesel Engine Co., St. Louis.

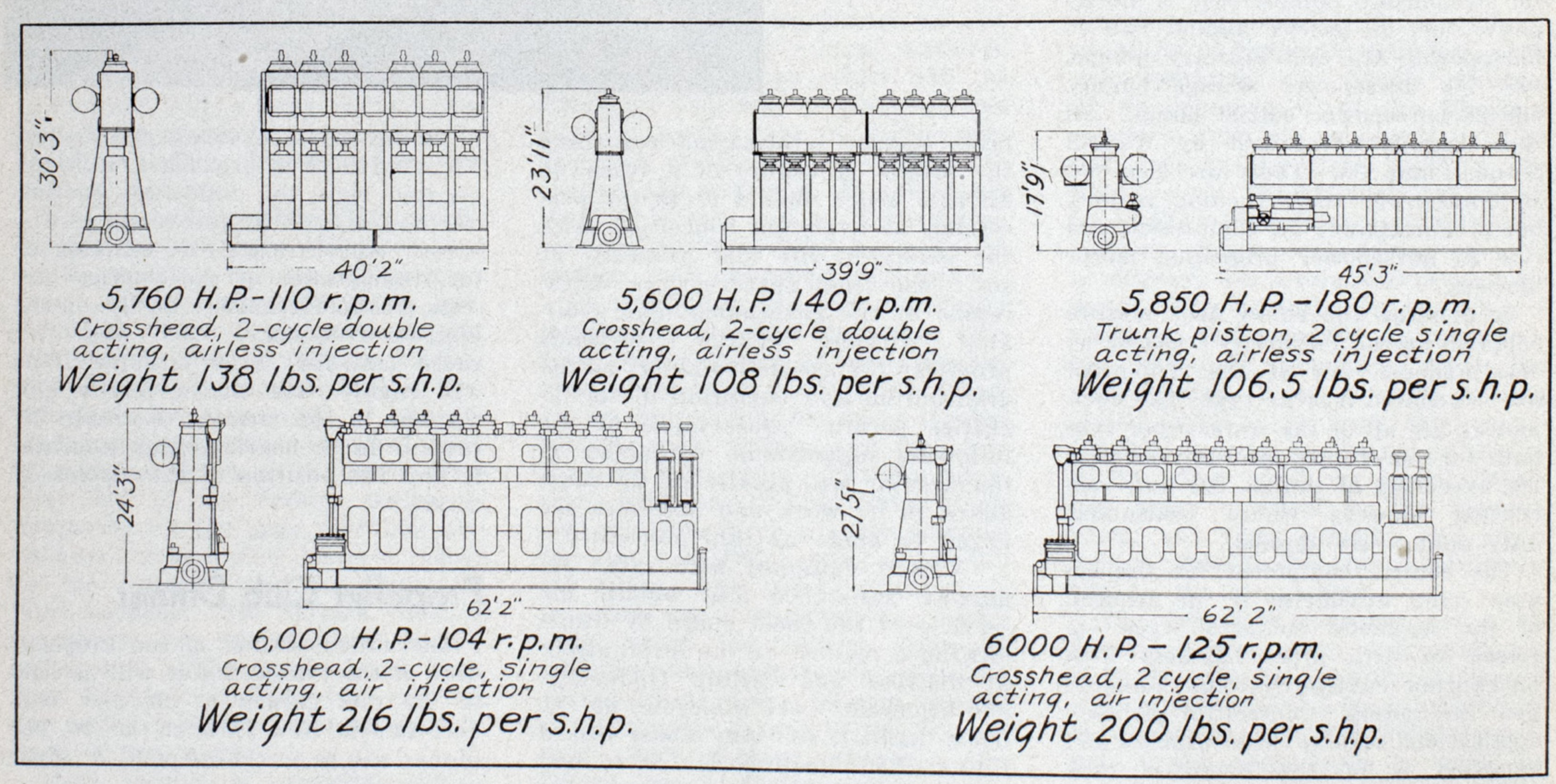


Fig. 1. Diagrams showing progress in diesel engine design. Comparing the slow speed, air injection, single acting, crosshead, 2-cycle Busch-Sulzer engine supplied for the first Shipping Board Conversion Program in 1924 with subsequent designs and finally the medium speed, trunk piston, airless injection two-cycle engine of virtually the same power and of less than half the weight

prise over 80 per cent of ships of 6000 tons and larger, Lloyd's reported June 30, 1931 under construction in the United States one diesel ship and 11 steamers; while Great Britain was building 22 diesel ships compared with 7 steamers and Germany, Sweden, Holland, Denmark, Norway, Italy, and Spain were building 53 diesel ships and no steamers at all in these sizes.

The familiar names of many of the world's oldest, largest, and most successful ocean shipping companies are found in the following list of 43 owners of foreign diesel passenger-cargo ship fleets, totaling 431 diesel ships of over 3,000,000 tons. This is only a partial list of foreign diesel ships, but enough to show the competitive menace to 82 American lines, operating 700 vessels of 4,000,000 gross tons. This year, it is estimated that 180 diesel ships of over 1,000,000 tons will be added.

The largest passenger liners of over 100,000 shaft horsepower, employ steam at present, due to the limiting size of the diesel—a limit that is rapidly being removed; but the fast cargo, the 16 to 18-knot combined cargo-passenger and the 18 to 24-knot medium sized, moderate speed passenger ships of the future are surely destined to be diesel ships, burning, for average speeds, under 0.40 pounds of fuel per shaft horsepower compared with over 0.70 pounds. required by the turbo-electric ships under recent trials in America.

Foreign Passenger-Freight Diesel Ship Fleets

Owner	No. of Diesel Ships	Approx. Tonnage
Hamburg-Amerika Line	27	200,005
Wilh. Wilhelmsen	30	182,477
Andrew Weir and Co	30	149,882
Union S.S. Co. of New Zealand	3	32,013
Furness, Withy & Co	23	177,936
Cie Generale Transatlantique	1	25,050
Osaka Shosen Kaisha	15	97,145
Nippon Yusen Kaisha	9	119,287
Silver Line, Ltd	19	112,151
Glen Line, Ltd	7	61,461
White Star Line	2	54,000
Rotterdam Lloyd S.S. Co	14	140,069
Fred Olsen & Co	10	54,759
Royal Mail Steam Packet Co.	5	72,521
New Zealand Shipping Co.	6	77,100
Florio Company	13	42,300
Netherland S.S. Co.	18	195,045
Knut Knutsen	4	19,371
Elder Dempster & Co., Ltd.	19	101,602
Hamburg South Amerika Line	6	67,675
H. C. Horn	10	38,805
Lloyd Triestino	8	65,948
Bibby S.S. Co., Ltd	6	57,854
A. Holt & Co	21	137,735
Holland-Amerika Line	4	38,944
Dampskibs Selskabet (A. P. Moller)	6	29,511
Union Castle Mail S.S. Co.	5	82,651
Pacific Steam Navigation Co.	8	61,765
Klaveness & Co	13	61,208
British India Steam Nav. Co., Ltd	4	30,109
Westfal, Larsen & Co	9	58,105
Commonwealth & Dominion Line	7	56,042
Ybarra y Cia	5	44,321
R.M.S.P. & Nelson Line	4	56,900
Messageries Maritimes	7	81,900
King Line	9	43,716
Axel Brostrom & Co	2	30,639
Swedish American Line	12	72,223
East Asiatic Co	11	81,856
Navigazione Generale Italiana	4	61,900
Cosulich Line	5	96,180
Mitsubishi Trading Co	5	33,042
North German Lloyd	5	38,436
	431	3,341,639

Again, in decided contrast, during the past five years only one modern diesel passenger-freight ship the City of New York has been built in the United States, while 489 aggregating approximately 3,700,000 tons have been built abroad.

Aside from the 24 diesel converted war built freighters of the shipping board, which are not comparable to modern motorships, only five of the principal American shipping companies operate diesel ships of over 1500 horsepower—the Grace line four, all built abroad—the Kerr line two—the American Hawaiian Steamship Co. two—the American South African line one—and the Ford Motor Co. three.

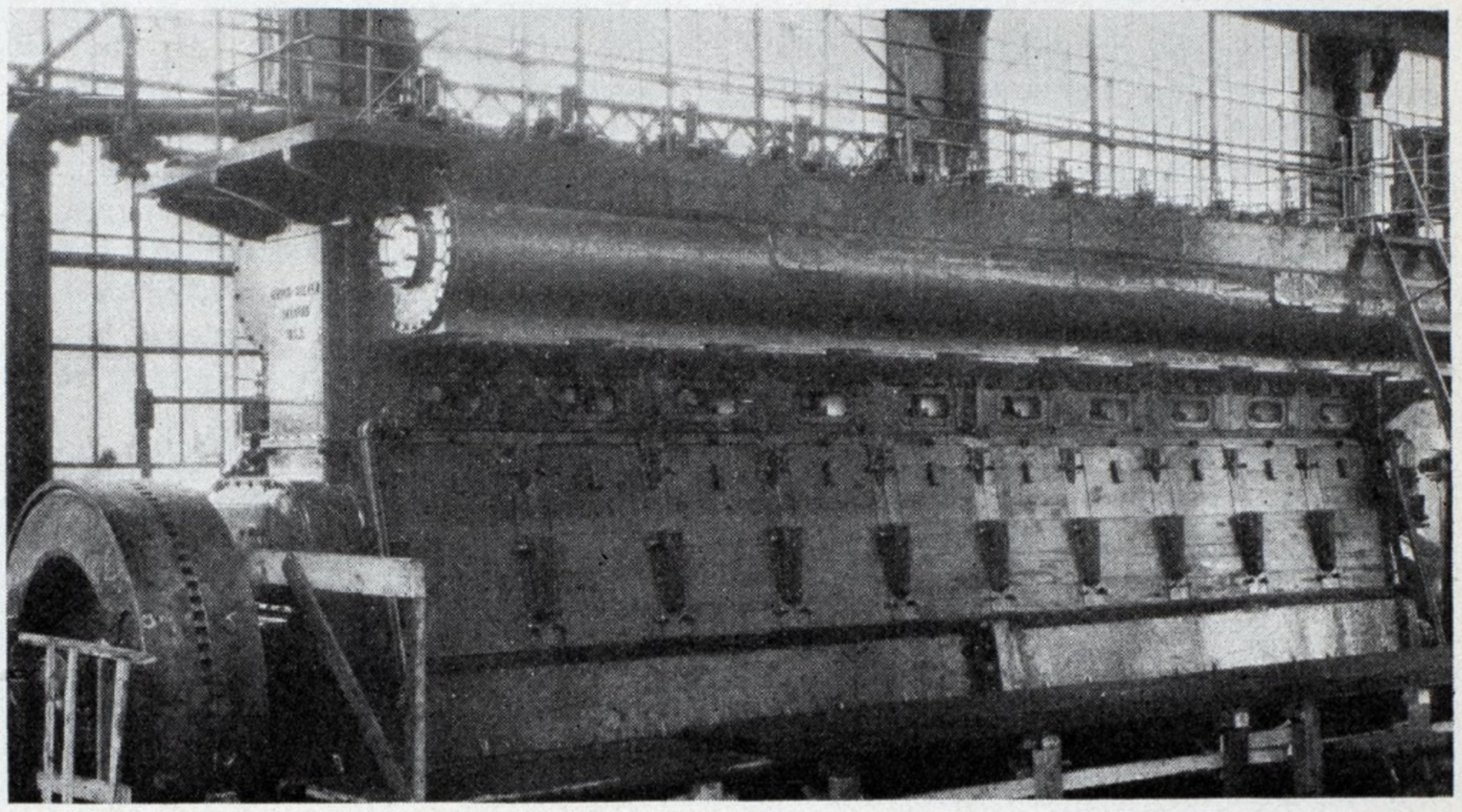


Fig. 2. Latest type Busch-Sulzer Trunk Piston Diesel, 3300 B. H. P.

Compared with these 431 foreign passenger-freight diesel ships of 3,341,639 tons, as before listed, there are only 17 comparable American motorships of 118,000 tons—in addition to the 24 obsolete, single purpose, shipping board steamers that were converted to diesel drive.

It cannot be too strongly emphasized

American Passenger-Freight Diesel Ship Fleets 1500 B.H.P. and Over

Owner	No. of Diesel Ships	Approx. Tonnage
Grace Line	4 (built abroad)	27,900
American Hawaiian S.S. Co.	2	15,798
Ford Motor Co.	3	25,652
Kerr Line	2	6,972
Clamar S.S. Co.	1	6,892
American South African Line.	1	10,000
Sun Oil Co.	1	11,850
Submarine Boat Corp.	1	3,545
Ocean Motorship Co., Inc.	1	4,029
Seekonk Corp	1	5,083
United States Shipping Board	24 (Converted)	153,090
	41	270,811

that these foreign shipping companies formerly operated steamships and have now adopted the diesel ship only after actual experience over several years, which has very apparently established decided advantages for this type. These advantages are many and are not at once apparent from a brief survey of merely the comparative cost of diesel and steam machinery and the comparative cost of diesel and steam fuel at a particular port. The modern diesel ship has not even been tried out in America, and little is actually known about its net saving in operation over a steamship.

The first striking differential between land and marine power plants is the fact that *a ship must carry its fuel.* A certain amount of fuel may be carried in the double bottom and other out of the way compartments in a ship which are not available for cargo. If the ship must carry fuel in excess of that which can be so carried, it encroaches on the cargo space, demanding a larger ship. Also, such excess fuel is not only a non-revenue cargo, but demands a larger power plant and constant power expense for the transportation of such excess fuel throughout the long life of a ship, of 20 to 30 years.

European practice has established that diesel and steam machinery weights including water in the steam boilers and condensers may be accepted as equal, for modern practice. A diesel ship requires about 0.40 pound of fuel per shaft horsepower hour. A steamship, depending on the type of steam equipment employed, consumes from 50 to 150 per cent more.

Consider a ship of 18 knots speed, 20,000 shaft horsepower and fuel bunkers for 5000 miles. The diesel ship must carry 1000 tons of fuel, a steamship from 1500 to 2500 tons. A steamship must accordingly be from 500 to 1500 tons larger to provide bunker capacity for the larger amount of steam fuel; and additional power must be provided —and additional fuel burned—to transport at 18 knots this additional weight of fuel. If such a steamer requires 0.75 pound of fuel per shaft horsepower, before leaving port for 10 days sailing she must load 750 tons—20 carloads—more fuel than a diesel ship. The transportation of this fuel at 18 knots is certainly an added cost to its purchase price.

The diesel ship Amerika running in the Pacific-European trade is claimed

to be the most economical ship in the world.

Unfortunately foreign operators of diesel ships do not freely divulge actual operating costs, which in this depression are vital in successfully competing at greatly reduced rates for passenger and freight business. However, at the recent trials of a sister ship, the EUROPA, fuel consumption was established at 0.36 pound per brake horsepower per hour for all purposes. It was claimed that the mechanical efficiency of the power plant would be increased by 4 per cent after the engines had been run in, in service.

Recovery of Waste Heat

The hotel load, usually a direct addition to the fuel consumption of the steam propelling plant, is provided in modern motorships by the utilization of the waste heat recovery from the exhaust gases and jacket cooling water. The north Atlantic diesel passenger ship BRITANNIC has five waste heat boilers producing 10,000 pounds of steam per hour for general ships purposes. The comparatively large demand on ship board for hot water in kitchens, baths and passenger cabins offers far more favorable utilization of diesel waste heat than the average land power plant.

The production on the BRITANNIC of ½ pound of steam per brake horsepower from exhaust gases, increases the thermal efficiency of the diesel plant to around 43 per cent. Further heat utilization of available hot water, may easily result in passenger ships, in increasing this thermal efficiency to above 50 per cent, whereas full utilization of all recoverable waste heat from engine cooling water and exhaust gases, would increase the thermal efficiency of the diesel power plant to over 75 per cent,. In fact, land plants utilizing diesel waste heat for evaporation of sea water have established diesel overall thermal efficiencies of above 80 per cent.

The most modern of high pressure, superheated-steam land power plants, with very large units, have attained thermal efficiencies of around 27 per cent; but 25 per cent for the smaller installations used in ships may be taken as a high figure which indicates clearly that the most modern steam passenger vessels require from 50 to 100 per cent more weight of fuel than the most modern diesel ships.

The statement is often made that because a ship is seldom fully loaded, the extra carrying capacity of the diesel ship is not a valuable advantage. But, in all fairness, the diesel ship should accordingly be built smaller than the steamer for the same expected pay cargo; and it usually is, with direct saving in first cost. Or the additional bunker capacity may be utilized by the diesel ship operating on any trade route to purchase enough fuel for the round voyage at the particular port of call where fuel is cheapest; or, again, to purchase excess of such cheap fuel above its own reqirements for supplying other ships of its owner or for sale at its home port.

It is obvious that a diesel ship operating from New York to the West coast of South America will bunker at Panama, where diesel fuel costs less than at New York or New Orleans. In general, American and foreign ships compete on the same trade routes and would fuel at the same, most favorable, world ports.

Consuming fuel at approximately one-half the rate, the diesel ship will run approximately twice as far as the steamship on the same quantity, saving time and expense in bunkering and buying fuel where cheapest. As a naval auxiliary, the diesel ship is capable of long voyage operations independent of foreign naval bases. In the great war we were fortunate in being able to use the ports of an ally across the Atlantic as a fueling base. It is hardly safe to count on a recurrence of these circumstances in future wars, even if we remain neutral.

Consider that the splendid fast Japanese motorships recently appearing on the Pacific can travel nearly twice as far as our new American steamers without refueling; that they can quickly be converted into airplane carriers; that we lack adequate naval bases in the Pacific; and then measure the value of the double cruising radius of the naval auxiliary merchant diesel ship in time of war, or the strategic value of Germany's 50,000 diesel horsepowered "pocket" battleship DEUTSCHLAND.

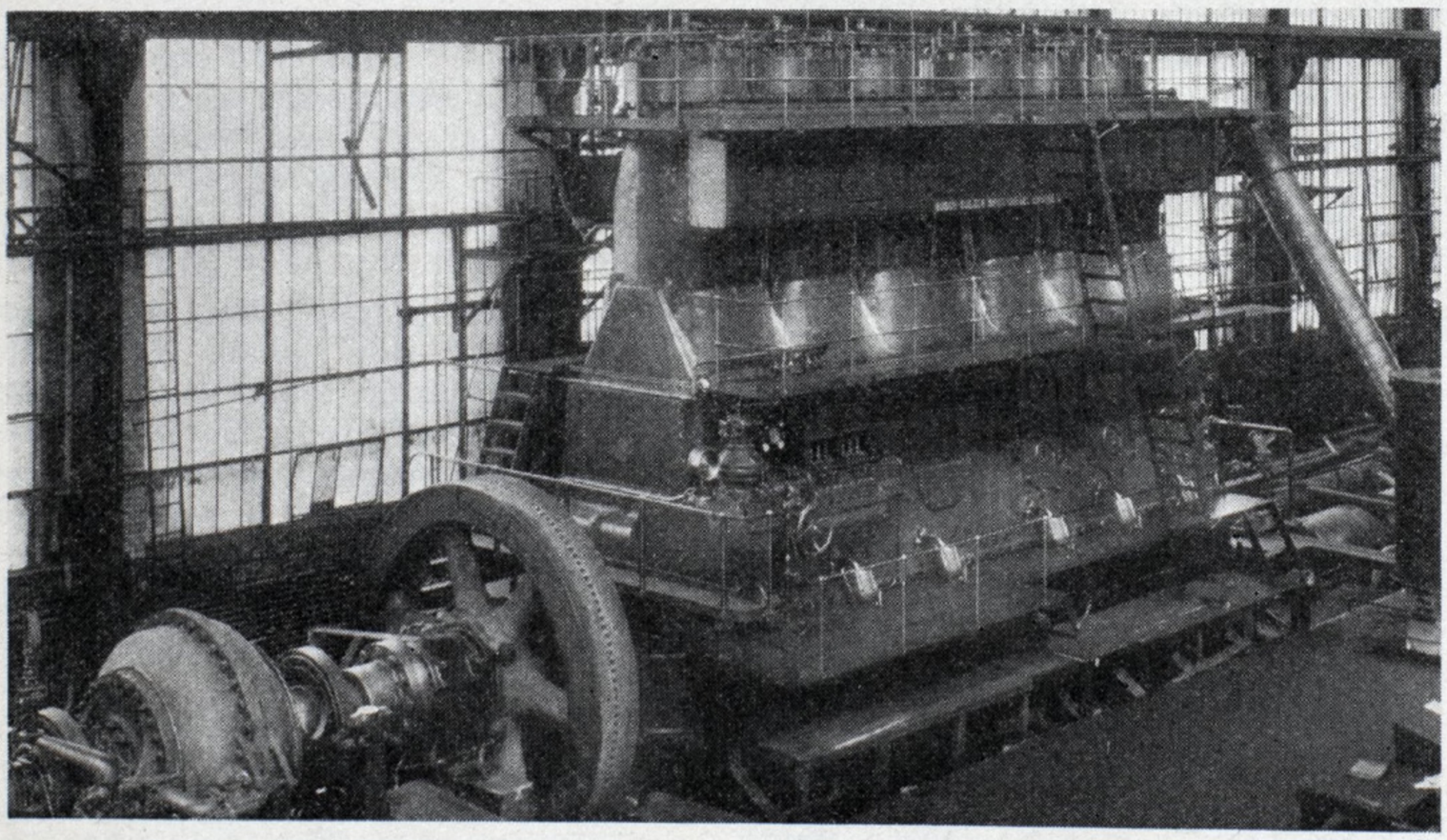


Fig. 3. Diesel, 4000 S. H. P. with World's Largest Solid Injection Cylinders

Cruising Speed Economy

The diesel ship in war service has a further advantage over the steamship in being able to operate at low speeds with practically full load and speed economy; whereas the economy of the steamship at light loads and speeds falls rapidly. It would appear that foreign nations, with greater experience in carrying on naval warfare in foreign waters, have recognized more quickly the advantage of the longer sailing radius of both the diesel man-of-war and the diesel merchant marine auxiliary.

The smaller engine room crew of the diesel ship makes a direct saving in quarters, payroll, subsistence and liability.

The reduction of diesel operating cost in port are many. First there is the enormous saving in fuel in handling cargo. Fuel losses in banking of fires under boilers are eliminated. Likewise, loss of time and fuel required for getting up steam is absent in the diesel ship. In changing from one berth to another full propulsive power is available within a few minutes time, often saving towing charges. The speed of the diesel ship is more constant, and requires only valve adjustment of the fuel supply to the engine. Also change in speed may be made instantly, over wide ranges; and higher speed demands no more effort from the crew.

That the upkeep of a diesel ship is less has been established by a number of reports made by foreign shipowners operating diesel and steamships. Only minor wearing parts of the diesel require replacement and the life of a diesel ship is ten years greater than that of a steamer. After 20 years in service, the diesel propelling machinery of the SELANDIA is found to be good for at least ten years longer. Several motorships after seventeen years in service have been fitted with new auxiliary boilers, while the diesel engines required no major replacements. If the life of a diesel ship may be safely taken at 25 per cent longer than the steamship, the actual fixed charges are accordingly less. The obsolescence of diesel engines now 25 years in service is nil; as their economy and serviceability have neither been impaired nor exceeded by other types of power plant.

Much has been written of the improvements in steam economy during

the past ten years, first by manufacturers of steam equipment and second by the "dyed in the wool" type of old steam engineers still controlling the policies of a few steamship lines.

Super-power plants in the electrical utility field have been directly responsible for the improvement in the efficiency of large steam turbines. The adoption in marine practice of high pressures and high superheat is less favorable than in land plants, where pure water and expert supervision is readily available at all times. That substantial progress has been made in marine work is exemplified by the reduction in fuel consumption per shaft horsepower from around 1.1 pounds for the LEVIATHAN to around 0.7 pound for new turbo-electric and latest geared turbine ships and around 0.6 pound predicted for the steamship of the future.

But the fuel consumption of the diesel ship has also been improved. Only a few years ago 0.5 pound per shaft horsepower was generally taken as the fuel consumption of the air injection, single acting, marine diesel installation. Development has, however, proceeded rapidly in higher mechanical efficiency with airless injection, improved scavenging, supercharging, exhaust turbo scavenging, waste heat utilization, higher power with lighter weight in double acting diesels and, finally, comparatively large engines of the trunk piston, airless injection type, combining, with inherent simplicity, low head room, minimum weight, space and fuel consumption.

The reported trials of the 20,000 shaft horsepower GEORGIC establishing an overall fuel consumption of 0.36 pound per shaft horsepower, compare with this one of the latest type 2850 indicated horsepower, 2-stroke, single acting, new Burmeister & Wain airless injection engine in the KALUNDBORG of approximately 0.39 pound per brake horsepower hour. It may be safely stated that the average fuel consumption of all the passenger-cargo steamers so far built with government aid under the Jones-White law, and, of course, older ships benefiting by mail subsidies, is above 0.72 pound per shaft horsepower hour— over twice that of the diesel ship GEORGIC.

After fifteen years experience in operating both diesel and steamships, freight and passenger types, the Pacific Steam Navigation Co. placed in service this year the 17,800-ton REINA DEL PACIFICO fitted with 22,000 brake horsepower airless injection, pressure charged, trunk piston diesels on quadruple screws. On the trials with the engines developing 18,000 shaft horsepower, sufficient for regular service speed of 17 knots, the fuel consumption for all purposes was reported as less than 0.40 pound per brake horsepower hour. Waste heat recovered from the exhaust and jacket cooling water is estimated to be sufficient for all requirements when the ship is at sea.

The weight and cost of these trunk piston engines are lower than in former types of diesels, and the low height is exceptionally favorable for passenger accommodations, again increasing the commercial efficiency of the ship.

An idea of the past few years of American diesel development, which has accomplished striking reduction in weight, space, height and cost, is presented in Fig. 1, showing comparison of the slow speed air injection, single acting, crosshead, 2-cycle, Busch-Sulzer engine of the type supplied for the first shipping board conversion program at a cost of $83.33 per horsepower in 1924 —with the progressive designs of later higher speed, single acting, air injection; double acting, slow speed, airless injection; higher speed, double acting, airless injection; and finally medium speed, trunk piston, airless injection, two-cycle engines.

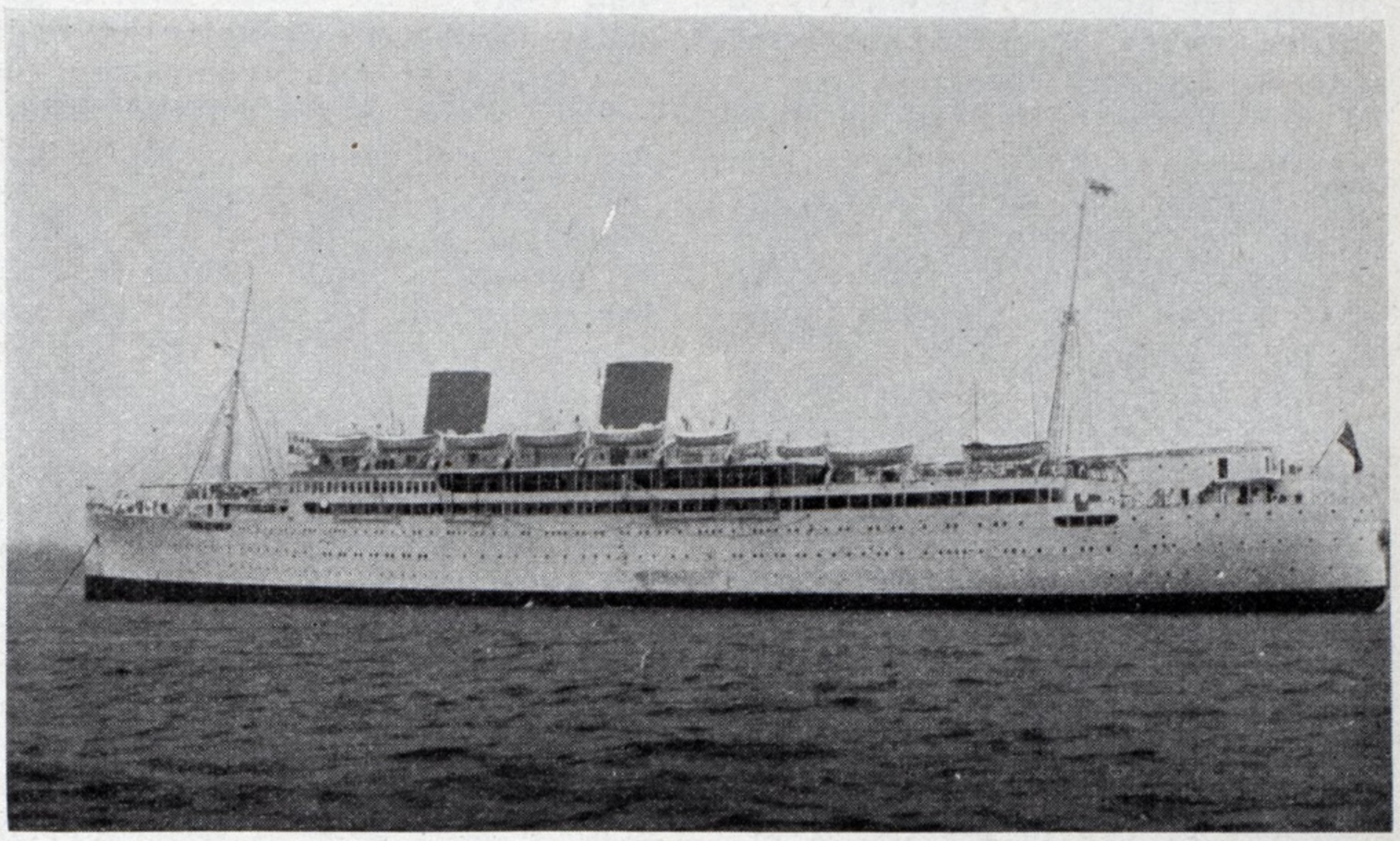
This latest type of trunk piston marine engine presents the utmost simplicity of construction and operation, light weight, small floor space, low head room and moderate speed. The 3300 horsepower engine illustrated in Fig. 2, has a short stroke of 27 inches for rotative speed of 240 revolutions per minute and weighs less than 100 pounds per horsepower, including scavenging blower and accessory equipment. Longer stroke engines operating in marine service at around 150 revolutions per minute would weigh slightly more, but substantially less than earlier crosshead types. With reasonable quantity production of modern types of marine diesels, the price per horsepower current in 1924, should be reduced approximately one-half, with less expensive foundations for lighter engines and lower cost auxiliaries. Up to date this reduction in cost of American diesel ships has not been established, owing to lack of inquiries to American shipyards for diesel tonnage during the past several years. Rough estimates based on former costs are too high and are largely responsible for the lack of consideration given diesels by shipowners.

Fortunately, American diesel builders have kept fully abreast of European diesel development, and are now prepared to supply the latest types of marine diesels for the replacement of our obsolete slow speed, uneconomical cargo carriers.

The Hooven, Owens, Rentschler Co. is now building five 7000 horsepower double acting, airless injection, medium speed diesels of the same general design as the latest M. A. N. marine type, for a 35,000 horsepower electric utility station, the largest diesel plant in the world, for the City of Vernon, Calif.

The Busch-Sulzer Bros. Diesel Engine Co. recently completed for demonstration purposes a 4000 horsepower reversing diesel with airless injection applied to 30 x 42-inch cylinders, the largest so far placed in operation, and ran successful shop trials with heavy fuel of 18.1 degrees Baume before shipment for stationary installation. Also, the Busch-Sulzer 3300 horsepower trunk piston, airless injection, stationary engines, two of which have been sold, are the largest in the world of this new type to operate on the two stroke cycle. But while the rest of the world completed over 300,000 horsepower of Sulzer type engines in 1930 and had over 300,000 horsepower building on Jan. 1, 1931, Busch-Sulzer has not received a single order for marine ship diesels since 1927.

Fortunately, several hundred old, antiquated, slow inefficient cargo carriers must soon be replaced. There is still time for America to adopt the marine diesel; and she can now benefit by foreign diesel ship development by building the latest and least costly of modern diesel ships. The continuing inclination toward the almost complete exclusion of diesels, however, demands prompt investigation of the facts herein presented and energetic action on the part of American marine engineers, shipbuilders and shipowners.



Reina del Pacifico, Built by Harland & Wolff, 1931. 17,707 *Gross Tons, Motorship*

European Shipping Still at Low Ebb

No Real Sign of Revival—Launch Exhibition Ship Scheme—Work Suspended on a Number of New Vessels—Cancel Surplus Sailings to Reduce Expenses

By Frank C. Bowen

ONCE again there is little enough that is bright to report in most sections of European shipping and shipbuilding during the quarter, particularly in British. Many of those connected with the industry appear in fact, to be now staying in business as much for the sake of seeing what can possibly happen next as for any other reason, for the slump shows no signs of passing away and is certainly the worst known by the shipping industry for a century at least.

Admittedly some process of rationalisation was very badly needed after the war boom which glutted the markets with tonnage that could not possibly be used and which was frequently of poor character. During past slumps there has usually been no difficulty in getting such surplus tonnage, or at least the best of it, absorbed by the growing groups of which there always seem to be at least one or two in process of development. On this occasion the slump has coincided with the creation of what is practically a new type of ship, the fast steam or diesel cargo liner, so that the usual growing groups have been building up their fleets with special tonnage built to their own design and have bought in the open market far less than on any previous occasion.

Another influence which has tended to keep in existence a mass of useless tonnage which would be far better scrapped is the fact that the banks seem to have been as hopelessly optimistic over the duration of the boom as the veriest tyro in shipping matters. They are now hoping to get some, at least, of their money back if things recover and in the meantime are naturally discouraging the disposal of their security. There is no doubt that, if the truth were now known, the British banks would be by far the biggest ship owners in the world and would very dearly love to be out of the business if only there were a way out.

Few Bright Spots to Record

There are few enough bright spots to record during the quarter for there is certainly no real sign of the much talked of revival. At the same time there are two or three examples of making the best of a very bad job which show that the shipping and allied industries still have all their old enterprise if only they can be given a chance to show it. The agreement between the North German Lloyd and Hamburg American line is working very smoothly and there is no doubt that it has made possible a reasonable return to the shipowner without impairing the service given to the public. There are some economists in Germany who are rather apprehensive at the enormous proportion of the national mercantile marine which is coming under the influence of the few men at the head of the two parties, but there are others who argue that the combination is giving the greatest possible service during the slump, and that when prosperity returns there will be plenty of firms springing up to take advantage of it. Naturally enough, the combination of so many services which were formerly run in keen competition has meant a surplus of tonnage, and a number of the older ships have been sold. Most of these have gone to the scrappers either in Europe or Japan but a few have been bought for running.

The Galway scheme is at last in proper working order and there appears to be every prospect of the Irish harbor figuring very largely in the revival plans of the transatlantic companies. It should be noted that the sponsors of the present scheme have avoided the two great mistakes which had so much to do with making former projects a failure; they are only considering it as a port of call and not as a terminal and there is a generous measure of local support which should secure a certain amount of public sympathy which has been absent before. Needless to say, the promoters have to fight the keen competition of the people of the Cork district whose trade will be seriously affected by any success scored by Galway.

Another small but quite hopeful portent is the successful launching of the British exhibition ship scheme. The former Bibby liner LEICESTERSHIRE has been converted into a very attractive exhibition ship and under the name of BRITISH EXHIBITOR is to sail for South American and West Indian waters, with particular attention to the Latin American markets, almost immediately. Many exhibition ship schemes have been started since the war but this one really looks as though it is to be carried to a successful conclusion.

Those three points, however, are very small when one compares them with the mass of depressing material to be considered. At the end of June the shipyards of Great Britain and Ireland had under construction only 555,603 tons, nearly 850,000 tons less than at the corresponding period in 1930 when things appeared to be bad enough and the lowest figures recorded since 1887. And even of this poor total no less than 68,000 tons was labelled "work suspended" without any definite information as to when it would be recommenced. In the quarter immediately preceding the war British yards were building 57.2 per cent of the world's output; in these figures the precentage has fallen to 30.4. There are many more shipyards than there were in 1914, and countries are building their own ships which formerly bought, but practically all the shipbuilding countries of Europe are very hard hit at the moment, although not quite so hard hit as Britain, and Denmark is about the only reasonably prosperous one.

Not only is work suspended on a number of new ships under construction but also on a number of modernization schemes which were giving much needed work to the yards and engineering establishments. As an instance, the Clan line was so pleased at the results obtained by adding a Bauer-Wach turbine to the reciprocating engines fitted in so many of their ships that they launched a big program for the purpose, converting all the cargo liners whose types promised successful employment with higher speed. This program has now been held up pending some signs of improvement and although it is the directors' intention to restart at the first opportunity it is a serious loss to the business which is snatching at any order.

Shipbuilding Credits Not Justified

The British government went into the question of shipbuilding credits carefully and finally decided that the move was not justified by the financial state of the country—that was before the departure from the the gold standard—and that with the present glut of tonnage in the world it was undesirable from more than one viewpoint. As the proposal was that Russian credit should be guaranteed in order to get the order for new ships there was a good deal of bitter political feeling introduced into the discussion, but the general feeling is that the decision was cor-

Trend of Trade and Shipping in British Isles

	June	July	August	Eight months ended Aug. 31 1931	1930
Total entrances of cargo ships into British ports:					
Number of vessels	5,355	5,283	5,275	36,810	39,147
Tonnage	5,585,754	5,643,883	5,680,126	39,897,943	42,186,688
Tonnage from Atlantic coast of North America	1,282,002	1,136,977	1,108,325	7,367,830	8,569,981
	(23.1%)	(21%)	(19.6%)	(18.5%)	(20.3%)
Total clearances from British ports:					
Number of vessels	4,733	4,989	4,608	36,524	40,761
Tonnage	5,072,081	5,355,916	5,018,246	38,729,902	44,258,937
Tonnage going to Atlantic coast of North America	1,001,055	1,001,200	938,560	6,267,187	7,225,169
	(19.9%)	(18.7%)	(18.7%)	(16.2%)	(16.3%)
Total value of goods:					
Exported	£35,475,990	£39,187,670	£32,986,969	£307,038,889	£460,659,825
Imported	£68,641,743	£70,145,883	£65,261,086	£553,059,989	£706,560,441
Exports of coal:					
Tons	3,750,415	3,532,816	3,226,814	28,044,618	37,135,926
Value	£3,062,826	£2,876,606	£2,611,148	£22,652,037	£31,085,636
Tonnage shipped for use of steamers	1,200,403	1,163,419	1,230,649	9,449,011	10,391,396

rect, even though the slight relief would have been very welcome.

In the present circumstances of the shipbuilding industry it is only natural that a move should be made to reduce wages and this suggestion was put before the men through the excellent machinery which the industry maintains for avoiding trade disputes. At the conferences the men refused to accept the reduction, but when the employers announced that it would be put into force in any circumstances all but the boilermakers in South Wales accepted under protest, the first reduction Oct. 1.

The much discussed giant Cunarder is to be launched in February instead of the summer and of course there is infinite argument as to what her name will be. This has been kept a close secret, not only on account of the publicity value of exploiting the old sea superstition concerning the announcement of a ship's name before her launch, but also for fear of piracy under the merchant shipping act which is designed to prevent duplication. The general opinion is that she will be the BRITANNIA, suitable in every way and capable of being reserved for the company's use until required by the fact that they already have a BRITANNIA in the Anchor line service. The construction of this giant ship has brought up many dredging problems in the Clyde but these have now been settled and there should be no delay in getting her to sea.

On the Continent in the shipping side perhaps the most interesting event of the quarter has been the sudden announcement that the Compagnie Generale Transatlantique was in serious financial trouble and appealing to the help of the French government. It has been reorganized with the assistance of the state, a proposal to amalgamate it with the Cyprien Fabre line having failed, but the state is getting its full pound of flesh in the shape of seats on the board and almost complete control. The Adria line of Trieste, part of the Cosulich group, has also had to reconstruct, in spite of the very generous subsidies which are paid to it by the Italian government, while the directors of the Holland American line have quite frankly stated that some form of reconstruction will be necessary. The company has had a splendid history since its foundation in 1871 and it is certain that the Dutch people will not see it go if it can possibly be avoided. An other former International Mercantile Marine company, the White Star line, has also had a very depressing report to publish and Mr. Walter Runciman, who was in the chair in place of Lord Kylsant, pointed out that it was obvious that an operating loss could not go on for year after year and that something would have to be done, although every possible effort would be made to retain the goodwill of so historic a concern.

In order to reduce expenses most of the European transatlantic companies Cunard, White Star, North German Lloyd and Campagnie Generale Transatlantique among others agreed among themselves to cancel sailings which are surplus to the requirements of the trade and several yachting cruises have also been wiped out for lack of support. Cuts in fares have been arranged, varying from ten to 30 per cent in the first class and 13 per cent in the third class, while the £10 special rate to Canada has been suspended while the Dominion has far more settlers than she knows what to do with. In spite of this drastic reduction on the North Atlantic there still appears to be plenty of support for the most conspicious ships; the North German Lloyd BREMEN and EUROPA are always well booked and the Canadian Pacific EMPRESS OF BRITIAN, which continues to lower her own records until 24½ knots to Father Point is quite normal, is very well supported.

In order to relieve the burden of idle tonnage the Baltic conference has put forward a scheme for reducing the loading of each ship by ten to 15 per cent in order to absorb the same proportion of idle tonnage. The opposition to this scheme by European shipping companies is unanimous, although it is rather curious to note that every section bases its opinion on different ground. At the same time it is fully realized that something will have to be done concerning the amount of laid-up tonnage which costs shipowners many thousands per annum.

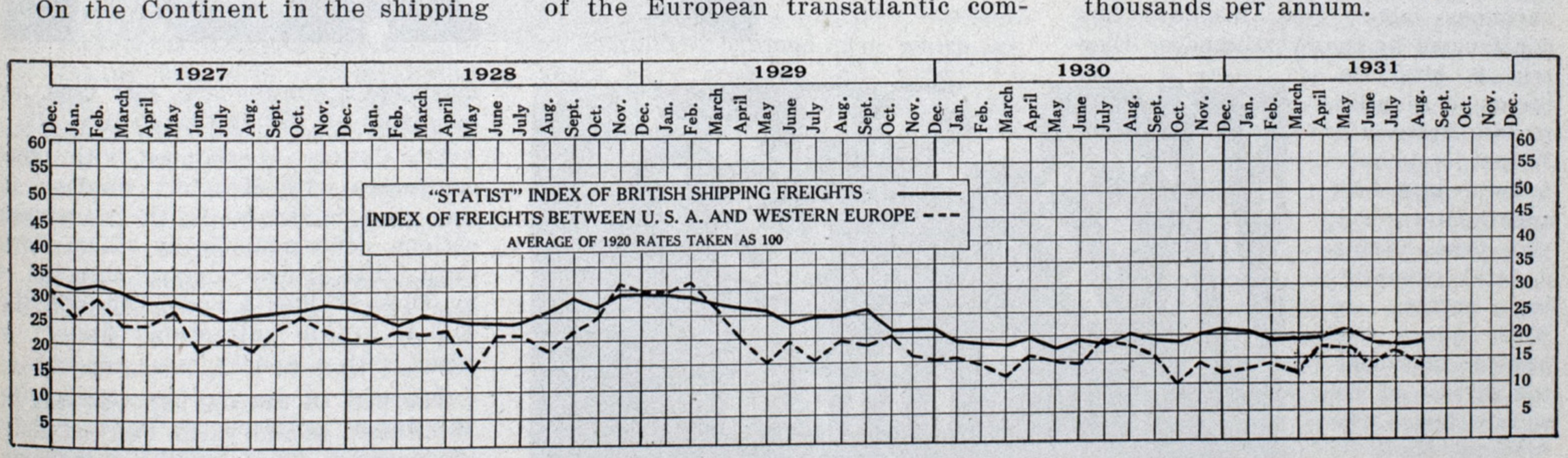


Diagram Showing Fluctuation of Ocean Freight Rates for Four Years and Eight Months

Launch Coast Guard Cutter Cayuga at Staten Island

WITH Rear Admiral F. C. Billard and other high ranking officers of the United States coast guard present, the new cutter CAYUGA, was launched at the Staten Island plant of United Dry Docks, Inc., Oct. 7, the new queen of the fleet sliding down the ways in a faultless launching. The sponsor was Miss Clara A. McAllister, daughter of Capt. C. A. McAllister, president of the American Bureau of Shipping and retired engineer-in-chief of the coast guard.

As the last block gave way and the steel hull started down the ways, twelve white doves were released from a concealed cage in the bow and circled the ship as she gained momentum for her first dip. Miss McAllister was honored at a dance at the Biltmore the evening of the launching.

Coast guard officers attending in addition to Rear Admiral Billard included Capt. R. B. Adams, engineer-in-chief; Constructor F. A. Hunnewell, superintendent of construction and repair; Capt. John Boedeker, chief inspector of construction; Capt. H. N. Wood, inspector of machinery, and Capt. Randolf Ridgely, Jr., commander of the New York division.

The CAYUGA a sistership of the SEBAGO, is of 2000 tons displacement, 250 feet long, 42 feet beam with a draft of 15 feet and a depth of 26 feet, 10 inches. Her 3000 horsepower turbo-electric main engines will drive the craft at a speed of 17¼ knots. Her contract speed is 16 knots and cruising radius 8000 miles. The CAYUGA's peace time armament will consist of one 5-inch .51 calibre gun, 3-inch anti-aircraft gun and two 6-pounders. In time of war she would be able to mount three 5-inch guns and two 3-inch anti-aircraft rifles. She will carry a crew of 125 officers and men.

The main propelling machinery of the CAYUGA includes standard coast guard turbo-electric drive of the synchronous motor type, designed and constructed by the Westinghouse Electric & Mfg. Co. Steam is supplied by two Babcock & Wilcox watertube boilers, interdeck superheater, marine type, having a total evaporating surface of 6336 square feet and a superheating surface of 696 square feet. The driving plant is equipped with Diamond soot blowers and Babcock & Wilcox feed water regulators. The plant has a working pressure of 265 pounds per square inch with 175 degrees of superheat. Boilers are operated on open fire room with draft furnished by two Sturtevant multivane, turbine driven, induced draft fans.

Main turbine generator includes a Westinghouse impulse reaction turbine suitable for operation with 250 pounds of steam and 175 degree Fahr. superheat, with 28½ inches of vacuum, driving a three-phase 60-cycle two-pole generator through a solid coupling.

The propulsion motor, synchronous type, is of revolving field, salient pole type rated at 3200 horsepower, three-phase, 60-cycle, 44-pole, 163.6 revolutions per minute at 2300 volts.

With a Kingsbury thrust bearing, the line shaft is 12¼ inches in diameter while the propeller shaft is 13 inches in diameter and covered with Sandusky centrifugally cast bronze liner. The propeller is a Cramp four-blade right hand solid manganese bronze unit, 11 feet nine inches in diameter with a 11-foot, six-inch pitch and 18-inch rake.

Auxiliary power is furnished by four generators, three turbine driven and one driven by an alternating current induction motor. For port use there is a geared turbine driving a 62½ Kva, 240 volts, three-phase 60-cycle alternating current generator at 1200 revolutions per minute and its exciter. A direct current motor generator set for searchlights includes a 25 horsepower drip proof motor direct connected to a 15 kilowatt, 120 volt shunt wound direct current generator. Motor-driven auxiliaries, such as circulating pump, fire and bilge pumps, main condensate, fuel oil and evaporator feed pumps were supplied for the most part by the Warren Steam Pump Co. All motors with controls, ventilation motors, and practically all motor-driven machinery below deck are supplied by Westinghouse. A Lee turbine drives the fire pump and a Terry the fuel oil pump. Practically all valves in the ship are of Powell manufacture while deck auxiliaries are manufactured by American Engineering Co.

Gyro-compass equipment is supplied by the Sperry Gyroscope Co., the same company furnishing two high intensity arc 30 million candle power searchlights for pilothouse control and one 18-inch two million candle power searchlight mounted on the forward mast and a similar size, spot type, for mounting on the superstructure aft.

The CAYUGA is equipped with Lietz compasses with Kearfott windows in the pilot house while the communications equipment is by Chas. Cory Corp. The trident electric ship log is by Thos. Walker & Sons, Ltd. and the R.C.A. radio direction finder is fitted with a Sperry radio repeater.

The keel of the CAYUGA was laid at the Staten Island yards Feb. 17, 1931, the contract price for the ship being $865,000.

Right — Cutter Cayuga being launched at Staten Island Oct. 7. Below — Launching party. Left to right; the sponsor, Miss Clara A. McAllister, daughter of the president of the American Bureau of Shipping; Joseph W. Powell, president United Dry Docks Inc.; Capt. J. Boedeker, chief inspector of construction United States coast guard; Mrs. C. A. McAllister, mother of the sponsor; and Mrs. J. Boedeker

History of the Society of Naval Architects and Marine Engineers

BY JAMES SWAN

THE substitution of iron for wood in the construction of ships, a development which acquired material proportions about the year 1860 was very nearly co-incident with the beginnings, in practical application, of the modern science of naval architecture.

The design of vessels, as well as their construction, was, up to the middle of the last century an art rather than a science. While some of the underlying principles of scientific naval architecture, as it is today known, had been enunciated, but little in the way of practical application of these principles to the art of designing and building ships had been accomplished. Mathematical investigation of the properties of floating bodies had, particularly by the French, been developed to an advanced degree, but the influence of mathematical analysis upon ship design was very limited in extent, nor was it needed to produce successful vessels.

The development of the sailing ship to its ultimate perfection in the famous clippers of this country and Great Britain was a course of gradual improvement based upon hard won experience—of trial and error. The ability and technical skill of the constructors of these ships was of the highest order, but the science of naval architecture as it is today known, played a very minor part in the work.

The transition from sail to steam, gaining headway at about the same time, brought new problems, the answer to which could only be derived from patiently analyzed experience.

Advent of Steam Propulsion

So long as wood remained the principal material of construction, the size of vessels was limited to relatively small dimensions. The advent of iron and with it the application of the steam engine to propulsion not only moved the limits of size far into the future but with accompanying changes of type and proportions, brought forward questions of strength, stability and resistance—in short, shipbuilding, from being a work of the specialized artisan, became, gradually, a branch of engineering.

As one result of the developments which have been outlined, there met in London in January, 1860, with the object of forming a society for the promotion and increase in knowledge of the art of shipbuilding, a body of 18 men. Among these were some of the leading shipbuilders, engineers and mathematicians of Great Britain —Woolley, Scott-Russell, Barnaby, Penn, Grantham, Reed—names familiar as household words to the trained naval architect of today.

The new society, the Institution of Naval Architects, had its first meeting on March 1, 1860. Its proceedings, published regularly since that time, form a compendium of the science and practice of naval architecture.

In this country but few iron ships were built until after the Civil war period. Some few iron war vessels were constructed during the war, but after its close, for many years shipbuilding of any sort was at a low ebb, the activities of the country being turned to the development of the west and the building of railroads. Up to 1880, wooden vessels continued to be in the majority, built, mainly for the coast trade. Iron steamers were also built in considerable number for this same trade and a few for Atlantic and Pacific services. As in Great Britain, shipbuilding was becoming an engineering problem, but not until the birth of the new navy in the eighties, was there, in this country, a recognized beginning of the twin professions of naval architecture and marine engineering.

There being at the time no school of naval architecture in America, the navy department in anticipation of the building of the new fleet sent abroad for courses of study in the schools of Great Britain and France, certain young officers of particular ability; this practice being continued until recognized courses in naval architecture and engineering were available on this side of the Atlantic.

Thus, at about the period when steel was commencing to replace iron in ship construction, and modern shipbuilding and marine engineering were by way of being established in this country, there was formed a nucleus of technically trained men which, as years have gone on, has grown in numbers and accomplishment and today forms the backbone of American shipbuilding.

Community of interests and of training, as well as a clear foresight of what the future held for shipbuilding in this country, indicated to the foreign-trained construction officers of the new navy, the desirability of forming a society for the discussion of their work and the advancement of their art, modeled after the British institution.

The idea was first advanced at a dinner given by Assistant Naval Constructor (now Rear Admiral) D. W. Taylor to brother officers of the construction corps of the navy. This dinner was given at the University club in Philadelphia on July 26, 1892, the day of the launching of the cruiser COLUMBIA, in her day a very notable vessel.

There were present at this dinner, besides the host the following officers of the construction corps: Francis T. Bowles, Thomas F. Ruhm, Washington L. Capps, Richard M. Watt, and Lewis Nixon, a former member of the corps. During the dinner, Constructor Bowles gave a talk emphasizing the desirability and importance of establishing a technical society of naval architects, engineers and shipbuilders. The idea met with a most favorable and hearty response and Constructor Bowles was asked to undertake the preliminary work of organizing such a society. Asistant Naval Constructor Capps was delegated to act as provisional secretary and to prepare letters to be sent to shipbuilders, marine engineers, naval constructors and others professionally interested in shipbuilding.

Constitution Adopted by Society

The original constitution of the society was drafted by Assistant Constructor Capps, and approved by Constructor Bowles prior to its adoption by the society at large. The articles of incorporation were drawn up by Harrington Putnam, a distinguished admiralty lawyer, who later became a judge of the supreme court of the state of New York. The actual signing of the certificate of incorporation took place in Mr. Putnam's office at 45 William street on April 28, 1893. The incorporators, among the most prominent men of the time, and for many years previous connected with shipbuilding and ship operating were the following: William H. Webb, Chas. H. Cramp, H. T. Gause, George E. Weed, W. T. Sampson, Horace See, Francis T. Bowles, W. L. Capps, E. D. Morgan, George W. Quintard, Harrington Putnam, J. W. Miller, F. L. Fernald. Messrs. Quintard and Miller, being absent at the meeting of April 28, signed the certificate later, and it became effective in due legal form on May 10, 1893.

A brief sketch of the distinguished gentlemen who signed the certificate of incorporation is of interest:

William H. Webb, one of the foremost shipbuilders of the United States.

Builder of many famous wooden clipper ships and of ships of war for this and other nations. Founder and patron of the Webb Institute of Naval Architecture.

Charles H. Cramp, a son of William Cramp, who founded the William Cramp & Sons Co., for many years the president and guiding spirit of that famous shipbuilding plant.

H. Taylor Gause, president of the Harlan & Hollingsworth Co., one of the oldest and best known shipbuilding companies in the country, and the builders of the first iron vessel to be constructed in this country.

George E. Weed, financial assistant to John Roach, proprietor of the Roach shipyards and engine works in Chester and New York.

W. T. Sampson, rear admiral in the United States navy, at that time chief of the navy bureau of ordnance and later distinguished by his services during the Spanish-American war.

Horace See, for many years chief engineer of the Cramp company, and later a leading consulting engineer. The designer of many steamships.

Francis T. Bowles, later chief constructor of the navy and rear admiral. One of the first two officers to be sent abroad for the study of naval architecture and shipbuilding.

Washington L. Capps, later chief constructor of the navy and rear admiral, constructing corps, United States navy.

Edwin D. Morgan, an enthusiastic and accomplished yachtsman. Manager of many of the large yachts built to defend the America's cup.

George W. Quintard, founder of the Morgan Iron Works and the Quintard Iron Works in New York City. Both a builder and operator of ships.

Harrington Putnam, admiralty lawyer, later judge of the New York state supreme court.

Jacob W. Miller, a distinguished naval officer and teacher. President of the New England Steamship Co. and commodore of the naval militia of the state of New York.

Frank L. Fernald, a member of the construction corps of the navy.

The response to the call for members in the new society was immediate and gratifying. The initial roll was comprised of 262 members, 155 associates and 3 juniors. The list included practically all prominent members of the shipbuilding industry in this country, many active ship operators, and a body of younger men, many of whom later rose to eminence in the profession. The members of the construction corps of the navy, to some of the younger of whom the society owed its inception, were from the start and have continued to be most active and prominent in its activities and their numerous contributions to its proceeding have been of the very greatest value and interest to the profession. Of the construction corps members of the society at the time of its organization in 1893, eight have served as chief constructor and chief of the bureau of construction and repair in the navy department. These eight were Rear Admirals Wilson, Hichborn, Bowles, Capps, Watt, Taylor, Beuret and Rock.

Admirals Bowles, Capps and Taylor, and a former member of the construction corps, Homer L. Ferguson, have held the office of president of the society.

Society Attracted Active Interest

It was a matter of particular gratification to the founders of the society that it attracted from the first the active interest of the seagoing officers of the navy, both of the executive and engineering branches, many of whom have been numbered among its members from its inception to the present day. As already noted, Admiral Sampson was one of the incorporators. Admiral Meade and Commodores Loring and Melville were on the first list of vice presidents. Admirals Sampson and Chadwick and Chief Engineer Kafer were on the first list of members of council, while Commodore Melville, Lieutenant Niblack and Professor Durand, formerly engineer corps, United States navy, contributed papers to be read at the society's first meeting. It is also gratifying to note that the society has continued to benefit from this interest on the part of seagoing officers of the navy. A mere mention of the names of Rear Admirals Rae, Griffin, Cone, Robison, Halligan, Yarnell, Dyson and McFarland amply attest this fact, all of the foregoing, with the exception of Dyson and McFarland having also served as chief of the bureau of engineering in the navy department.

To enumerate those in civil life who have contributed to the society's welfare and the enrichment of its transactions would be to furnish a "Who's Who" of American naval architects, shipbuilders and ship operators; but it is not amiss to repeat what has already been stated that the list of the society's original members included practically all prominent members of the shipbuilding industry in this country, many active ship operators, and a body of younger men, many of whom later rose to eminence in the profession." The society has continued to rely with confidence upon the increasing number and the active and effective support of this great body of professional and business men who are always so deeply interested in the building and operation of ships. Without the active, earnest and efficient support of this great body of its membership the society would soon cease to exist.

The first president of the society was Clement A. Griscom of Philadelphia, a leading figure in the shipping world and president of the International Navigation Co. Mr. Griscom continued in office for ten years and upon his retirement was succeeded by Admiral Bowles.

The list of presidents with their term of office is as follows: Clement A. Griscom, 1893-1903; Francis T. Bowles, 1904-1909; Stevenson Taylor, 1910-1912; Robert M. Thompson, 1913-1915; Stevenson Taylor, 1916-1918; Washington L. Capps, 1919-1921; Walter M. McFarland, 1922-1924; David W. Taylor, 1925-1927; Homer L. Ferguson, 1928-1930; J. Howland Gardner, 1931.

The first meeting of the society was held Nov. 16, 1893, in the auditorium of the American Society of Mechanical Engineers at 12 West Thirty-first street, New York City. The annual meeting was held at this auditorium each year, until 1909, when it was transferred to the new Engineering Societies building at 29 West Thirty-ninth street.

In June, 1909, a summer meeting was held at Detroit. As the attendance at this meeting was not as large as had been hoped for, no summer meetings have been held since that time. Special evening meetings have, however, been held in January, 1919, May, 1921, May, 1922, June, 1923, and November, 1930. A joint meeting with the American Society of Electrical Engineers was held in November, 1921.

From 1893 to the present, approximately 550 papers have been presented at the meetings of the society and published in its transactions.

While the foundations of the present science of naval architecture had already been laid when the society came into existence and its proceedings of necessity, lack such epoch making records of initial investigation and research as appeared in the earlier transactions of the parent institution in Great Britain, many of its papers have been of the greatest scientific and practical value. Undoubtedly its greatest contribution to the profession has been the records, published from time to time, of Admiral Taylor's monumental investigations of resistance and propulsion. The work of this internationally known and honored scientist forms a unique and vitally important factor in the sum total of knowledge of this most complex but essential department of naval architecture.

Today, the Society of Naval Architects and Marine Engineers has a total membership of 1650. Its present and past members include the men who made the United States navy and the United States mercantile marine what they are today; the men without whose lifelong experience and guiding hands, the World war shipbuilding program would have been an utter failure. They have successfully met every condition with which they have been confronted; have solved every problem so far as it could be solved. What the future may hold for our naval and merchant fleets, no one may know, but certain it is that so long as our flag continues on the seas, it will be flown on ships designed and built by members of the Society of Naval Architects and Marine engineers.

Society of Naval Architects Its Aims and Purpose

IT IS appropriate with the approach of the annual meeting of the Society of Naval Architects and Marine Engineers, to be held in New York Nov. 19 and 20, to call attention to the function of this organization. Primarily the aim of the society is to promote progress in American shipbuilding and, through developments in this art, to advance the economic status of shipping.

The annals of the society constitute a complete record of the development of modern ship design and construction, as well as of marine engineering in the United States. Its membership is composed of the leading naval architects, marine engineers, engineers of professions allied to shipbuilding, steamship owners and operators and others interested in maritime affairs.

These facts do not give a true picture of the close personal relations that characterize the meetings of this body. Representatives of every possible phase of the industry are given an opportunity, both at the professional sessions and socially, to crystalize the intangible thoughts and ideas on their work, which constitute progress. With carefully prepared papers on widely diverse subjects as a basis for discussion, the opportunity is available to reduce developments to their best and most practical form.

The inability of the average engineer to express himself before a group of his associates is an inherent weakness, which participation in a meeting of this kind does much to correct. This applies particularly to the younger members of the profession. Facility in the co-ordination of ideas, and ability to state them under the critical circumstances attending discussions of technical matters is an important qualification of an executive. The earlier in his career that a young man develops this ability, the farther he will go in his profession.

Further, the society is as keen for the development of the younger generation of engineers and for their ideas as is true today of industry in general. For this reason, through its membership committee, the society has earnestly endeavored to bring to the attention of younger men connected with shipbuilding and allied fields, the benefits of membership in its ranks. Older men recognizing the importance of the work of the society are also urged to give them support by becoming members. Last year the efforts of this committee resulted in an increase of over 250 members in all classes, while so far this year a considerable number of individuals have applied for membership.

While time yet remains before the anuual meeting convenes, every member should interest those of his acquaintance in the industry, who do not already hold membership, in the work and benefits of the society.

The society will publish in the near future a combined index of the first 38 volumes of the transactions. The index will contain a thorough key to the subject matter in the transactions by names of authors, titles of papers, names of ships, and various general subjects. It will also be completely cross-referenced. The size will be 6 by 9 inches, printed on durable paper and bound in cloth.

Naval Architects Meet in New York Nov. 19-20

THE thirty-ninth annual meeting of the Society of Naval Architects and Marine Engineers will be held in the auditorium of the Engineering Societies building, 29 West Thirty-Ninth street, New York City, Thursday and Friday, Nov. 19 and 20. Seventeen papers are scheduled for presentation at the professional sessions, which will begin each day at 9:30 a. m. The council of the society will meet at 3 p. m. Wednesday, Nov. 18 in the board room on the fifteenth floor of the Engineering Societies building.

On Thursday, Nov. 19, an evening session of the society will be held at 8:15 p. m. in the auditorium of the Level club, 253 West Seventy-third street, New York. Between the afternoon and evening sessions a dinner, to which ladies and guests are invited, will be held at the Level club at 7:00 o'clock.

The annual banquet will be held in the grand ballroom of the new Waldorf-Astoria hotel, Forty-ninth street and Park avenue, New York City, on Friday evening, Nov. 20, at 7:30 o'clock. Immediately preceding the banquet a reception will be held beginning at 7:00 o'clock. The titles of the papers, their authors, and the order in which they are to be delivered follow:

Thursday, Nov. 19, 9:30 a.m.

1. *Determination of Stresses in Plating from Strain Measurements*, by Prof. William Hovgaard, member.
2. *Investigation of Structural Characteristics of Destroyers, Preston and Bruce*, by Lieut. Commander Claude O. Kell (CC) U. S. N., visitor.
3. *Recent Developments in Special Quality Steels for Shipbuilding*, by William Bennett, member.
4. *Notes on the Development of Certain Materials Used in Ships of the U. S. Navy*, by Rear Admiral George H. Rock, (CC) U. S. N., vice president.
5. *New Structural and Decorative Materials as Applied to Shipbuilding*, by William E. Blewett, member.
6. *Some Recent Developments in the Shipbuilding Art in America*, by John B. Woodward Jr., member.
7. *Notes on the Launching of the T. S. S. Mariposa*, by James B. Hunter, member.

Thursday Evening, Nov. 19, 8:15 p.m.

8. *Interior Lighting Aboard Ships*, by Samuel G. Hibben, visitor.
9. *Recent Developments in Electric Propulsion*, by Charles F. Bailey, vice president, and Eskill Berg, member.

Friday, Nov. 20, 9:30 a.m.

10. *Some Features of a Modern Airship—U. S. S. Akron*, by Commander Garland Fulton, (CC) U. S. N., member.
11. *Model Experiments to Determine the Effect Upon Resistance of Variations in Length of Entrance, Beam, and Rise of Floor*, by Prof. Edward M. Bragg, member.
12. *Model Steering Tests*, by L. F. Hewins and Lieut. W. P. Roop (CC) U. S. N., visitors.
13. *On the Analysis of Ship Trial Data*, by Karl E. Schoenherr, member.
14. *Arc Welding in Shipbuilding*, by Harry W. Pierce, visitor.
15. *Design of American Super Liners*, by Theodore E. Ferris, council member.
16. *Electric Auxiliaries on Shipboard*, by Walter E. Thau, council member.
17. *Pumps for Marine Service*, by Irving W. Jackman, member, O. H. Dorer, H. M. Chase, visitors.

Mail Contracts Corrected to Date

Forty-Four Mail Contracts Awarded—Means Payment of $27,308,667 Annually—One Hundred and Twenty Ships Are Specified

Ocean Mail Contracts Awarded to American Steamship Lines to Oct. 15, 1931

Route Number	Steamship Cos. & Termini	Class of Vessels Required at Start of Service	Payment Fiscal Year 1932	Class of Vessels Required. Date of Mail Contract
4	**Munson Steamship Lines** New York to Buenos Aires	Class 3—18 knots—12000 tons	$1,255,280.00	None Aug. 1, 1928.
5	**Export Steamship Corp.** New York to Mediterranean and Black Sea Ports	Class 6—10 knots—4000 tons	2,185,050.00	Eight new vessels, four of Class 4 and four of Class 5. Class 4 ships, Excalibur, Exochorda, Exeter and Excambion completed. Total est. cost, eight ships, $18,400,000. Aug. 1, 1928; supplemental contract, Dec. 10, 1929.
6	**American South African Line** New York to Beira, Portuguese E. Africa	Class 6—10 knots—5000 tons	285,522.00	Two new Class 5 vessels. First ship, City of New York (diesel) completed. Total est. cost $3,900,000. Oct. 1, 1928.
8	**Grace Steamship Company** New York to Valparaiso	Two of Class 4—16 knots Others of Class 5—13 knots	1,399,366.00	Two new vessels of Class 3. First ship, Santa Clara, completed; second vessel in three years. Total est. cost $7,000,000. Aug. 1, 1928.
10	**New York & Porto Rico SS Co.** San Juan to Santo Domingo City	Class 5—13 knots—8000 tons	46,176.00	None. Borinquen (new) in service. Aug. 1, 1928.
15	**Eastern Steamship Lines** Boston to Yarmouth	Class 3—19 knots—5000 tons	237,000.00	None. Oct. 1, 1928.
16	**American Scantic Line** New York to Copenhagen	Class 6—10 knots—4000 tons	827,316.00	Eleven Class 5 vessels, reconstructed, at total est. cost of $3,013,510. Payments now made on basis of Class 5. Work to be done at stated intervals during period of contract. Oct. 1, 1928; supplemental contract Dec. 17, 1930.
17	**American West African Line** New York to West African Ports	Class 6—10 knots—4500 tons	289,500.00	Three reconstructed vessels of Class 5, one within fourth year and two during remainder of contract. Total est. cost $900,000. Oct. 1, 1928.
18	**Atlantic & Caribbean Steam Navigation Co.** New York to Maracaibo	Two of Class 5—13 knots Others of Class 6—10 knots	375,878.00	One reconstructed Class 5 vessel within third year of contract; est. cost $300,000. Oct. 1, 1928.
19	**Columbian Steamship Company** New York to Puerto Colombia	Class 6—10½ knots—2550 tons	264,940.00	Two new Class 4 vessels and one Class 5, not new, to be in service Jan. 1, 1933. Newport News S.B. & D.D. Co. lowest bidder on two ships at $4,600,000. Also one new vessel Class 4 (conditional) before end of fifth year. Total est. cost $6,750,000. March 1, 1930.
20	**New York & Cuba Mail SS Co.** New York to Havana	Class 4—16 knots—6000 tons	616,720.00	Two new vessels of Class 2; Morro Castle and Oriente completed and in service; total est. cost $10,000,000. Oct. 1, 1928.
21	**New York & Cuba Mail SS Co.** New York to Progreso	Class 5—14 knots—4500 tons	419,536.00	One reconstructed vessel of Class 5 within three years from award of contract. Est. cost $1,300,000. Oct. 1, 1928.
22	**Gulf Mail Steamship Co.** New Orleans to Progreso, Mexico	Class 6—10 knots—3000 tons	23,619.00	One reconstructed vessel of Class 5 within three years of contract; est. cost $75,000. May 1, 1929.
23	**Lykes Bros. Steamship Co.** Galveston to Santo Domingo	Class 6—10 knots	421,499.00	One reconstructed vessel of Class 5 within four years from award. Est. cost $100,000. Oct. 1, 1928; extended March 1, 1931.
24	**The Oceanic Steamship Co.** San Francisco to Sydney	Class 4—16 knots—4000 tons	747,230.00	Two new vessels Class 2 required and one new vessel Class 2 (conditional). All three, Mariposa, Monterey and Lurline under construction at Quincy, Mass. Total est. cost $25,500,000. Oct. 1, 1928.
25	**Dollar Steamship Line** San Francisco to Manila	Class 3—18 knots—12000 tons	1,489,296.00	None. Steamers President Hoover and President Coolidge, required on Route 27, operated on this route. Oct. 1, 1928.
26	**American Mail Line** Seattle to Manila	Class 3—18 knots—12000 tons	1,070,784.00	None. Oct. 1, 1928.
27	**Dollar Steamship Line** San Francisco to Colombo	Class 5—14 knots—10000 tons	1,141,296.00	Four new vessels, two of Class 2 and two of Class 3. First two ships, President Hoover and President Coolidge, completed. Total est. cost $32,000,000. Oct. 1, 1928.
28	**States Steamship Company** Portland to Manila	Class 6—10 knots—4000 tons	399,540.00	Two reconstructed vessels of Class 5, one during fourth year, and one during remainder of contract. Total est. cost $600,000. Oct. 1, 1928.
29	**States Steamship Company** Portland to Dairen, China	Class 6—10 knots—4000 tons	184,440.00	One reconstructed Class 5 vessel; est. cost $300,000. Oct. 1, 1928.
30	**Oceanic & Oriental Nav. Co.** Los Angeles to Auckland	Class 6—10 knots—4000 tons	169,740.00	None. Oct. 1, 1928.
31	**Oceanic & Oriental Nav. Co.** Los Angeles to Melbourne	Class 6—10 knots—4000 tons	210,960.00	None. Oct. 1, 1928.
32	**American Line Steamship Corp. (Panama Pacific Line)** New York to Balboa, Canal Zone	Class 3—18 knots—12000 tons	418,496.00	One new vessel, Class 3, (Pennsylvania) completed. Two similar new vessels, California and Virginia, already in service at start of contract. Est. cost each vessel $6,587,226. April 1, 1929.
33	**South Atlantic SS Co. of Del.** Savannah, Ga., via Brest to Liverpool; Savannah, Ga., via Plymouth to Bremen	Class 6—10 knots—4900 tons	350,055.00	Three reconstructed vessels of Class 6; est. total cost $150,000. Dec. 1, 1928.
34	**Pacific Argentine Brazil Line** San Francisco and Los Angeles via Bahia Blanca to Buenos Aires	Class 6—10 knots—4000 tons	303,922.00	Four reconstructed vessels Class 6 before third year of contract. Est. total cost $114,000. Jan. 1, 1929.
35	**Mississippi Shipping Co.** New Orleans and other Gulf Ports to East Coast of South America	Class 6—10 knots—4900 tons	718,928.00	Two new Class 5 vessels; total est. cost $3,900,000. Four reconstructed vessels Class 5 (two completed); total est. cost $2,000,000. July 5, 1930.
		Carried forward.....	$15,852,089.00	

(Continued on Next Page)

Ocean Mail Contracts Awarded to American Steamship Lines to Oct. 15, 1931

(*Continued from Preceding Page*)

Route Number	Steamship Cos. & Termini	Class of Vessels Required at Start of Service	Payment Fiscal Year 1932	Class of Vessels Required. Date of Mail Contract
		Brought forward.....	$15,852,089.00	
36	**Tacoma Oriental Nav. Co.** Portland to Manila and Dairen	Class 6—10 knots—4500 tons	347,679.00	Two reconstructed vessels Class 5; one during fifth year ofcontract and one later; total est. cost $750,000. July 1, 1929.
37	**Panama Mail Steamship Co.** San Francisco to Puerto Colombia	Class 5—13 knots—4500 tons	521,872.00	Two new Class 3 vessels required; a third optional; all contracted for at Federal S.B. Co. Total est. cost $12,750,000. July 1, 1930.
38	**Grace Steamship Company** Tacoma to Valparaiso	Class 6—10 knots—4000 tons	270,300.00	One new Class 3 vessel contracted for at Federal S.B. Co. Est. cost $4,200,000. July 1, 1930.
39	**United Fruit Company** San Francisco to Puerto Armuellas	Class 6—11 knots—3200 tons	519,784.00	Three new vessels of Class 4, Talamanca, Segovia and Chiriqui, contracted for at Newport News S.B. & D.D. Co. Total est. cost $10,575,000. July 1, 1930.
40	**United Fruit Company** New York to Limon (not yet in operation)	Class 5—13 knots—7200 tons	*485,724.00	Three new vessels of Class 4. Antigua, Veragua and Quirigua, contracted for at Bethlehem S.B. Corp.; total est. cost $10,575,000. March 21, 1930.
41	**United Fruit Company** New Orleans to Puerto Colombia (not yet in operation)	Class 6—11 knots—3200 tons	252,460.00	Two new vessels of Class 4 within five years of award. Total est. cost $7,050,000. March 21, 1930.
42	**United States Lines** New York to Southampton	Class 1—24 knots—45000 tons	616,128.00	Two new vessels of Class 1 not later than four years from date of award. Total est. cost $60,000,000. April 24, 1930.
43	**United States Lines** New York to Hamburg	3 Class 3—18 knots 1 Class 4—16 knots 1 Class 5—14 knots	1,693,584.00	Two new vessels of Class 2; contracted for at New York S.B. Co. Total est. cost $21,860,139. April 24, 1930.
44	**United States Lines** New York to London	Class 5—13 knots—8000 tons	1,055,184.00	Two new vessels Class 3, depending on five-year extension of present five-year contract. Total est. cost $14,500,000. April 24, 1930.
45	**Tampa Interocean SS Co.** Gulf ports to Spain and Portugal	Class 6—10 knots—4000 tons	466,200.00	Two new Class 5 vessels; total est. cost $3,900,000. April 6, 1930.
46	**Roosevelt Steamship Company** Baltimore to Hamburg	Class 4—16 knots—7000 tons	1,275,144.00	Five Class 4 reconstructed vessels (at Federal S.B. Co.); fifth ship completed Nov. 1931; est. total cost $9,220,000. After five years two additional new vessels of Class 3 (conditional). Total est. cost $7,000,000. March 21, 1930
47	**American West African Line** New Orleans to Ports on West African Coast	Class 6—10 knots—4000 tons	145,980.00	Two new Class 5 vessels, (conditional) total est. cost $3,900,000. July 1, 1930.
48	**Oceanic & Oriental Navigation Co.** San Francisco to Dairen, Manchuria	Class 6—10 knots—4000 tons	316,587.00	Two new Class 5 vessels, one within three years and other within seven years; total est. cost $3,900,000. July 1, 1930.
49	**Oceanic & Oriental Navigation Co.** San Francisco to Saigon, Indo-China	Class 6—10 knots—4000 tons	375,690.00	Two new Class 5 vessels, one within five years and other within nine years. Total est. cost $3,900,000. July 1, 1930.
52	**Eastern Steamship Lines** Boston to St. John New York to Yarmouth (Not yet in operation)	Class 2—20 knots—16000 tons	*308,620.00	Two new Class 2 vessels; contracted for at Newport News S.B. & D.D. Co. Total est. cost $8,000,000. Feb. 17, 1931.
53	**American Diamond Lines, Inc.** New York and other North Atlantic ports to Rotterdam and Antwerp	Class 6—10 knots—4000 tons	1,381,836.00	Five new Class 4 cargo vessels as soon as practicable. Two new cargo vessels, Class 4, additional (optional). Total est. cost $17,500.000. Oct. 1, 1931.
54	**Mobile Oceanic Line** East Gulf Ports to United Kingdom and other North European ports	Class 6—10 knots—4000 tons	1,084,288.00	Ten reconstructed vessels Class 5, total est. cost $5,000,000. Two new Class 5 vessels (optional); total est. cost $4,000,000 Additional vessels optional with increase of service. Oct. 1, 1931.
55	**Gulf Pacific Mail Line, Ltd.** Seattle to Tampico, Mex., via Puerto Colombia and Kingston	Class 6—10 knots—4000 tons	339,518.00	Two reconstructed Class 5 vessels, total est. cost $500,000. One new Class 5 vessel, est. cost $1,000,000. One new Class 5 vessel (optional) est. cost $1,000,000 One aditional new vessel (optional), est. cost $1,000,000. Oct. 1, 1931.
		Total Annual Payments All Mail Contracts.....	$27,308,667.00	

*Fiscal year 1933.

Key to Classes: Class 6—10 knots—4000 tons; Class 5—13 knots—8000 tons; Class 4—16 knots—10000 tons; Class 3—18 knots—12000 tons; Class 2—20 knots—16,000 tons; Class 1—24 knots—20000 tons.

American Foreign Trade

Figures prepared by the foreign commerce department of the Chamber of Commerce of the United States, Washington, and published in the forty-third quarterly issue of *Our World Trade* show that the total value of our foreign trade, exports plus imports, for the first half of 1931, amounting to $2,423,455,000, was the smallest total for a January-June period since 1914.

Exports for the January-June period of 1931 totaled $1,316,227,000 or 36.6 per cent below the 1930 figure and 44 per cent below the 1926-1930 average value. Exports of foreign merchandise, re-exports, amounted to $26,417,000, or 28 per cent smaller than a year ago.

Imports in the first half of this year amounted to $1,107,228,000, 36.2 per cent smaller than those for the same half of 1930 and 47 per cent below the 5-year average value.

Red Cross memberships on the high seas last year totaled 9073 among enlisted men and 14,748 among mercantile marines. Both figures represent increases over the previous year.

The annual membership campaign of the Red Cross opens this year on Armistice Day, Nov. 11, and extends through Thanksgiving, Nov. 26.

Annual Report Issued

The thirty-second annual report of the American Ship Building Co., Cleveland, for the fiscal year ended June 30, 1931, shows a net profit of $43,010.09, although the company incurred an operating loss of $84,446.29. The gross income from all companies after deducting sales allowances and manufacturing costs and expenses exclusive of operating charges amounted to $700,977.40.

The general depression existing in Great Lakes shipping was naturally reflected in the company's activities for the year, particularly in relation to the ship repair business.

Main entrance to Atlantic Works of Bethlehem Shipbuilding Corp., East Boston, Mass. Main office building in foreground

Historic Atlantic Works Modernized

Yard Incorporated at East Boston in 1853 now an Up-to-Date Ship Repair Plant Fitted with Efficient Machinery and Equipment

By G. A. Richardson

THE completion of a thorough program of modernization of the Atlantic Works of Bethlehem Shipbuilding Corp. rounds out a comprehensive plan of development during the past few years which has included all of Bethlehem's ship repair facilities on the East coast. These comprise three units. The Baltimore Dry Docks works at Baltimore, Md., is a new plant equipped to handle any and all kinds of jobs on any size of vessel coming into Baltimore harbor. The Simpson Dry Dock plant at East Boston, which was re-equipped and rebuilt several years earlier, has facilities for taking care of the needs of all the larger ocean going vessels. Lastly comes the Atlantic Works, which with the Simpson Dry Dock plant, operate as the Bethlehem plant. The Atlantic Works specializes on jobs pertaining to harbor vessels, tugs, fishing boats, etc., but with the available docking facilities can take care of vessels up to 450 feet in length.

The Atlantic Works was incorporated in 1853. During all the years this organization has been an important factor in the marine field in and about Boston. At the time of incorporation, it had large shops and specialized in the building of engines and boilers. From this it was an easy transition to the building of ships. During the Civil war two monitors and the turrets and engines for several others were built. It was not until 1892 that the Atlantic Works constructed its first marine railway although it later took over the railways of the East Boston Dry Dock Co., which dated back to 1853. In the years that followed there was a steady expansion in facilities both by the process of absorption of outside plants and the building of new units. In 1922 Bethlehem Shipbuilding Corp. became actively identified with ship repair work in Boston harbor by buying out the Simpsons Patent Dry Dock Co. In 1926 Bethlehem purchased the Atlantic Works.

The activities of the Atlantic and Simpson works cover a period of tremendous changes. It is a far cry from the days of clipper ships when the East Boston water front was one continuous line of shipbuilding yards, dry docks, and marine railways. Those were the times of world-beating records. The building of each new ship was a real event. Donald McKay and Samuel Hall surpassed themselves with each new vessel turned out, and these two famous names are intimately tied up with the story of the Boston plant. In 1853, 22 shipbuilding yards existed in East Boston. It was an era when the romance of shipping was intensified and the glamor of those days has grown rather than diminished. Despite this background of romantic history and traditions which have come down through the years, Bethlehem's two repair plants comprising the Boston plant are not handicapped by lack of progressiveness. Both are up to the minute in every respect as regards equipment and organization.

When Bethlehem took over the Atlantic works, immediate steps were taken to put it in the very best operating condition. Although the location of existing units necessarily had a bearing on the arrangement, the aim has been to plan things so that material can be moved to and from the various places with a minimum amount of effort and handling. The ground area covered is approximately fourteen acres and the actual available floor space in the shops is approximately 60,000 square feet. The equipment consists of machinery and facilities of the most modern types and any kind of ship repair work, regardless of its character, can be handled within the limits of the docking capacities. Skilled mechanics are available for taking care of all work relating to diesel engines, turbines and reciprocating engines. Total length of piers available is 1990 feet. In addition to the general run of ship work, the plant specializes in stationary work for shore plants. The machine shop is a jobbing shop with many special machines, such as marble grinders, macaroni machines, etc.

As a rule, those who make use of the facilities of a plant of this character are primarily interested in knowing that they are adequate and modern so that work can be done promptly and efficiently. At this point, therefore, cer-

tain outstanding features in the way of refinements of detail warrant special mention. They are as follows:

1. Electrical outlets. All piers are fully equipped with suitable outlets for every kind of portable equipment such as saws, grinders, welders, high cycle machines, etc. An important point to stress in this connection is that either AC or DC current can be furnshed for shore connectons.

2. Unusually good lighting facilities. Night work to be efficient requires plenty of good lighting. Every provision has been made for this requirement by floodlights and other auxiliary lighting equipment.

3. Protection against fire. The indirect losses resulting from fires are oftentimes greater than the direct ones, and efforts made to reduce the normal hazards are more than warranted. Water lines are provided on all docks and piers and have the necessary connections for hose. A salt water pump delivers water at 90 pounds pressure. Outside fire fighting facilities are also readily available. A city fire station is located within a quarter of a mile of the plant and a special telephone line gives immediate response to calls. In addition, a city fire boat is also located within a short distance.

4. Practically all of the equipment in the plant is electrically driven by direct drive. Belt drives have been eliminated.

The various units which go to make up the plant will now be taken up in detail in the same sequence that would normally be followed by a visitor going through the plant.

The Atlantic works at 80 Border street, is conveniently located and easily reached by a number of ways:

(a) By East Boston subway from Boston to Maverick square, which is five minutes walk from the plant. Total time about fifteen minutes.

(b) By the narrow-gage railway ferry to Jeffries Point, which is only two minutes walk from the Simpson Works. The Bethlehem corporation maintains bus connections every half hour with the Atlantic works.

(c) By automobile via Charlestown and Chelsea or across one of the two municipal vehicular ferries.

(d) The new East Boston vehicular tunnel, when completed, will give direct access to the plant.

The main office building, 173 feet long by 40 feet wide has four stories and is of brick. On the first and second floors are located the various administrative offices, accommodations for clerical and engineering forces, lunchroom for plant officials, foremen and visitors, locker rooms, shower baths, and other facilities for the convenience of surveyors, etc. A part of the first floor is used for a carpenter shop. The pattern shop is located on the third floor and pattern storage facilities are provided on part of the third floor and all of the fourth floors. An engineering and drafting room located on the second floor is competent to solve many troublesome problems which arise from time to time for shipowners.

The main entrance, as will be seen from the illustration, is simple in design and includes a brick gate house, etc. Just adjacent to this, housed in one new building on Border street, are the hospital and employment bureau.

An important unit is the power house which is fully equipped to take care of the maximum peak power demands of the works as well as the heating of the various units. Forty-six hundred volts, 60 cycles, 3 phase current is brought in from an adjacent city generating station and stepped down to 440 volts. Four hundred 40-volt motors are used for operating the various machines which form a permanent part of the plant equipment. Two hundred twenty volt direct current can also be supplied and for this purpose two motor generator sets, one of 200 kilowatt capacity and one of 125 kilowatt capacity, are provided.

Additional equipment in the power house includes the following:

Two 100-horsepower each Scotch dry back type boilers built by Atlantic works, fired with Bethlehem (Dahl) oil burners. One motor-driven 1600 cubic foot capacity air compressor. One steam-driven 100 cubic foot compressor for standby purposes.

A salt water pump does double duty furnishing water in the case of fire and also hot salt water for the marine railways. Hot salt water obtained by heating with the aid of a mixing valve is a necessity in this locality during the winter months. It is not only needed for thawing out the railways but also for cleaning ships which come in heavily coated with ice. Hot fresh water cannot be used as it freezes right away. A very small amount of salt is sufficient to prevent this. A separate eight car garage with a repair shop attached is located near the power house.

All metal working shops are housed in four adjacent units or shops so built that the whole area can be reached under cover without going out in the open. All the buildings are of brick and structural steel.

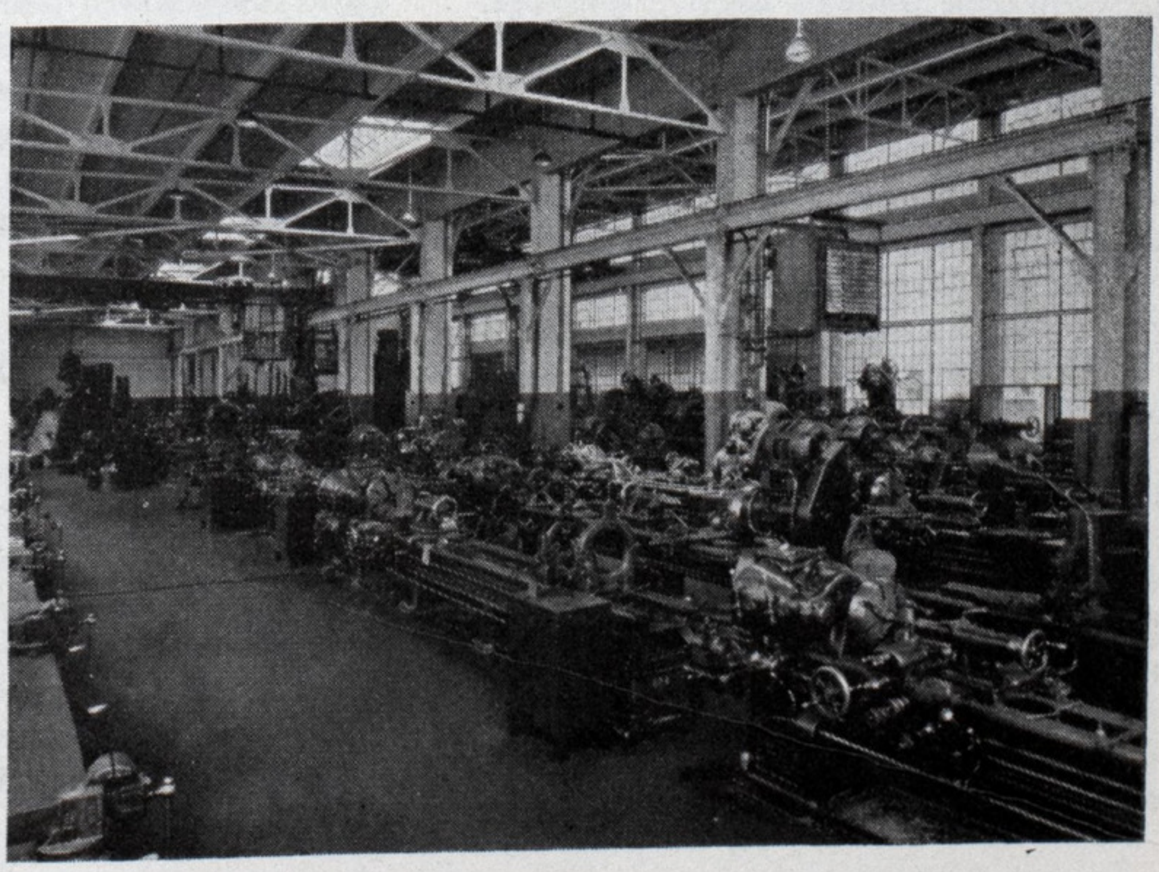
The machine shop is considered one of the finest in New England. It is combined with a pipe shop in a new building about 230 feet long by 90 feet wide. This building has about 20,000 square feet of floor space divided up into two bays, one high and one low, running the entire length. The high bay is equipped with a 15-ton crane and a 5-ton auxiliary hoist. The low bay is served by 5-ton overhead crane. Available equipment includes planers, one 200-ton hydraulic wheel press, radial drills, horizontal boring mills, slotters, vertical boring mills, the largest of which is 60 inches x 122 inches, vertical and horizontal milling machines, shapers, lathes of various sizes, up to 51 feet long and 93 inches swing, and miscellaneous tools including grinders, drill presses, bench drill, speed drill, etc.

Pipe of any size up to 12 inches in diameter can be handled in the pipe shop. Six threading machines ranging from two inches to 12 inches in capacity meet the present requirements.

The copper shop is located next to the boiler shop. It is equipped for work of large size and contains all of the usual machinery such as large hydraulic pipe bender, drill press, grinder, forge fires and crane. Any class of work that comes under the heading ship repair work can be satisfactorily handled.

The boiler shop is located adjacent to the machine shop and combine within itself the functions of boiler shop, blacksmith, sheet metal and structural fabricating shops in one. Total floor space is approximately 24,000 square feet. There are two bays, a high one served by a 25-ton overhead crane and a low bay served by 3-ton monorail system together with several jib cranes.

The Atlantic works absorbed the Robinson Boiler works, a well known East Boston concern, in 1894. The present boiler shop facilities include a wide range of equipment and many subsidiary shops for various classes of work.



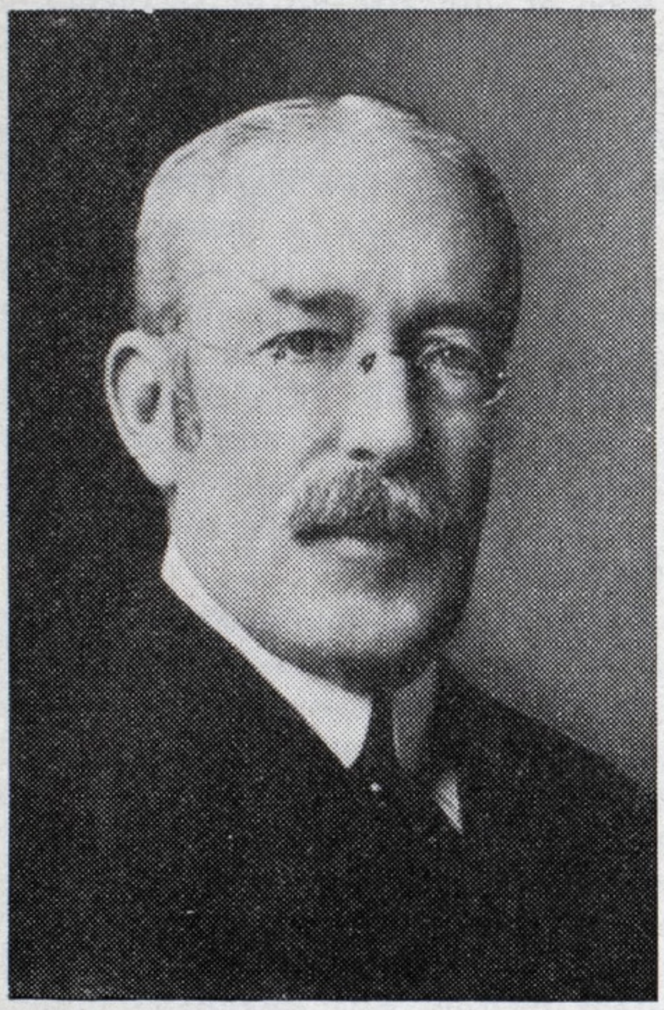
Small bay of machine shop looking toward heavy tool bay, Atlantic Works, East Boston, Mass.

Pioneer in Lake Iron Ore Industry Dies

SAMUEL MATHER, 80, whose death occurred at Cleveland Oct. 18, was a pioneer in the development of the early iron ore industry, one of the founders of Pickands, Mather & Co., and through numerous connections, in close affiliation with the steel industry from its early beginnings to the present.

Following his education in Cleveland public schools and at St. Mark's school, Southborough, Mass., Mr. Mather became interested early in his life in the initial activities of the Cleveland Iron Mining Co., which his father, Samuel L. Mather, had established in 1852.

In 1882 Mr. Mather, together with James Pickands and J. C. Morse, established the firm of Pickands, Mather & Co. and under his direction it developed into the second largest mining company in the Lake Superior district, owning, controlling and operating about 32 properties situated on the six principal ranges. The mines have capacity for producing 15,000,000 tons of ore annually and normally employ 5000 miners.



Samuel Mather

To provide means of carrying the ore to consumers at lower lake ports, a fleet of 49 vessels, the second largest on the Great Lakes, was gradually brought under the flag of the Interlake Steamship Co., a Pickands, Mather & Co. subsidiary.

Mr. Mather was a brother of William G. Mather, president of Corrigan, McKinney Steel Co., Cleveland, who is another outstanding figure in the history of Lake Superior iron ore mine development and whose company, Cleveland-Cliffs Iron Co., owns or controls many mines in Michigan and Minnesota and operates a fleet of 22 Great Lakes ore carriers. Samuel Mather's son, S. Livingston Mather, is vice president of the Cleveland-Cliffs company.

The charitable gifts of Mr. Mather to the Community Fund, Lakeside hospital, Western Reserve university, all of Cleveland have exceeded $8,000,000.

Henry A. Magoun Dies

Henry A. Magoun, 68, for 18 years vice president and general manager of the New York Shipbuilding Co., Camden, N. J. until his retirement six years ago, died at Bath, Me. on Oct. 25. He was a life member of the Society of Naval Architects and Marine Engineers, past president of the Atlantic Coast Ship Building association and a director of the Hyde Windlass Co., Bath, Me.

Joins Sharples Company

Carl J. Lamb recently resigned as manager of the marine (steam) apparatus sales department of the Westinghouse Electric & Mfg. Co. to accept an executive position with the Sharples Specialty Co. of Philadelphia, manufacturers of supercentrifuges for land and marine applications. Mr. Lamb will assume the duties of his new position Nov. 1, 1931.

Mr. Lamb was educated at the United States Naval academy from June, 1914, to June, 1917, and served as an engineer officer aboard the U. S. E. HENDERSON, navy transport. After the World war he worked one year at the New York Shipbuilding Co. He has spent several years at sea as licensed engineer on steam and diesel merchant vessels and holds licenses of chief engineer of steam and motor vessels.

For the past eight years Mr. Lamb has been connected with the Westinghouse company in the marine service, turbine engineering and sales departments. Three years ago he established the marine turbine sales department, of which he has been head up to the present time. He holds five United States patents on turbine machinery and has a sixth pending. He is a member of the Society of Naval Architects and Marine Engineers as well as several other engineering societies, and holds a commission of lieutenant in the United States naval reserve.

Retires from U.S. Lines

Martin L. Petry, publicity manager during the last five and a half years for the United States lines, recently resigned to become associated in an executive capacity with Eugene W. Castle, head of Castle Films, one of the largest industrial and merchandising motion picture producers in the country. His resignation became effective Oct. 1.

Head of Transportation Periodicals Dies

Colonel Edward A. Simmons, 56, president of the Simmons-Boardman Publishing Co. and affiliated companies, died of cerebral hemorrhage at his home in Brooklyn, N. Y., on Sept. 30.

Colonel Simmons was born in Brooklyn on March 10, 1875, and was educated in the public schools of that city. At the age of 14 he entered the service of the *Railroad Gazette* and in spite of his youth gained rapid promotion, subsequently becoming business manager. In 1908 he effected the merger of the *Railroad Gazette* with the *Railway Age* of Chicago and in 1911 became president of the new company. Under his leadership the company later initiated or acquired a number of other transportation periodicals including the *Railway Mechanical Engineer, Railway Engineering and Maintenance, Railway Electrical Engineer, Railway Signaling, Marine Engineering, The Boiler Maker, Airway Age* and in 1926 the *Railway Review*, which was comcombined with the *Railway Age.*

Col. E. A. Simmons

Colonel Simmons was chairman of the American Marine Standards committee. He was a prime mover in the formation and activities of this organization and had been repeatedly elected chairman since its establishment. During the World war he served with the quartermaster corps, being commissioned a major in 1918. He was an associate member of both the American Society of Mechanical Engineers and the American Society of Civil Engineers, member of the Society of Naval Architects and Marine Engineers and served as chairman of the endowment committee of the Engineering Foundation Inc.

Fireboat John J. Harvey largest yet built, launched Oct. 6, at Todd Yard, Brooklyn

John J. Harvey, Largest and Fastest Fireboat Launched

THE launching of the fireboat JOHN J. HARVEY for the New York fire department took place at the Tebo plant of the Todd Shipyards Corp., Brooklyn, Oct. 6. This boat, the largest and fastest of its type ever built, was christened by Miss Anne Dorman, daughter of the fire commissioner.

The all-steel fireboat JOHN J. HARVEY was designed by Henry J. Gielow Inc. and is a twin-screw gasoline-electric vessel having an overall length of 130 feet and a beam of 28 feet. The propelling machinery consists of five Sterling Viking engines that develop 2740 horsepower and produce a speed of 18 miles an hour and also supply the pumping power for the 8 nozzles to pour 16,000 gallons of water a minute.

The boat is framed transversely and divided into five compartments with four water-tight bulkheads.

The lower deck forward contains accommodations for the crew. Just forward of the machinery space on the port side and enclosed entirely with steel bulkheads, is the crew's lavatory of ample space and equipped with a shower, wash basins, water closets.

On the starboard side, also enclosed in steel bulkheads, is the air conditioning room which contains supply and exhaust fans of 2000 cubic feet per minute capacity, the air washer and all the necessary ducts to ventilate the entire ship.

The crew's quarters and mess room run from the machinery bulkhead forward to the galley and from side to side of the ship. These quarters are unusually roomy, containing two single metal beds, for emergency use and for the watch, 16 metal lockers, six stools and tables, all of metal and an electric water cooler. Eight airports light this space, making it a very complete, comfortable recreation room. Metal stairs lead from these quarters up to a closed passage, affording access to the main deck outside, to the officers' room, also on the main deck, and to another set of metal stairs leading up to the pilot house on the deck above.

Forward of the crew's accommodation on the lower deck is a well equipped galley outfitted as one would expect to find a modern home, completely equipped with monel metal dresser and sink, a two-plate electric hot-plate, coffee urn and a large electric refrigerator. Forward of the galley is a large roomy storeroom.

Beneath the main deck, forward of the aft peak bulkhead, is a compartment containing a gasoline tank of over 2000 gallons capacity. A fuel oil tank of 2000 gallons capacity is located in a double bottom tank at the forward end of the machinery space.

The fore and aft peaks are used for trimming purposes, the fore peak tank extending from the keel to main deck and the aft peak tank from keel to lower deck flat.

On the main deck house forward is a lounge for officers containing bed, bureau, desk and two arm-chairs, the furniture being made of light metal and absolutely fireproof; the room is entirely sheathed in light plymetal.

Aft of the lounge room comes the officers' lavatory complete with shower, water closet, and wash basin.

In the next compartment aft a combination exhaust, heat, oil-burning boiler has been installed and so arranged as to act as an exhaust muffler for the exhaust from the five main gasoline engines and also be capable of supplying heat to all the quarters and the engine room and keeping a temperature of 70 degrees when the weather outside is zero, and in addition, keeping the deck outside from freezing over.

Farther aft is the foamite room, outfitted with metal shelving to store foamite powder sufficient to cope with a large fire; and also space for the storing of three portable foam generators, complete with hose and nozzles. These generators can be used at any position on board or can be transported for more distant fire fighting.

The engine trunk, in which is housed the carbon dioxide cylinders, complete this steel main deck house, which is fireproof throughout, all doors being made of steel and the interior of the quarters insulated with asbestos backed plymetal.

Above the officers' lounge is the steel pilot house, with floor of composition and top and sides of asbestos backed plymetal. An electric steerer has been installed, equipped with clutch so that the steering engine can be instantly thrown in or out of action from the wheel house. A metal settee-bed has also been installed in this space. Windows of the sashless type, with mechanical raising and lowering device, will be of fire resisting glass.

The fire fighting equipment consists of three nozzles, two of 3000 gallons per minute capacity each, and one of 2000 gallons capacity mounted on the fire tower aft of the steel deck house; two of 2000 gallons capacity each atop the pilot house; one of 3000 gallons capacity on the main deck forward and one of 2000 gallons capacity on each dome platform.

There are four hose reels, housing a total of 3250 feet of hose, one located on the main deck forward and three located on the main deck aft.

In addition there are 12 outlet manifolds on each side of the main deck house.

To reduce hazard and insure complete absence of free surface in the fuel tanks, an Aqua system has been installed. This system automatically supplies water to the tanks, as fast as the fuel supply is depleted, thus keeping the tanks always full, and preventing the formation of gases.

A carbon dioxide fire-extinguishing system was installed, with remote control, to protect the engine room and gasoline tank compartments. This remote control is located in break glass boxes, where a strong pull of the handle will release the entire contents of the battery it controls.

Around all houses, inside and outside of the bulkwark rail is a perforated brass pipe; upon the release of a control the entire boat can be covered with a sheet of water, affording it ample protection when on duty in dangerous zones.

Latest Data on New Marine Work

Information on New Ships Ordered—Building and Repair Contracts Let—Shipping Board Loans Made, Authorized or Pending

ACCORDING to the monthly report of the department of commerce, Washington, American shipyards on Sept. 1 were building or were under contract to build for private shipowners 88 vessels aggregating 299,471 gross tons compared with 100 vessels aggregating 325,620 gross tons on Aug. 1. Of these vessels, 21 of 260,834 gross tons were steel self-propelled, each of 1000 gross tons or over.

The Bethlehem Shipbuilding Corp. had under construction a total of six vessels. Of these, two passenger and cargo vessels, each of 17,500 gross tons were building for the Oceanic Steamship Co.; three passenger and cargo vessels each of 7200 gross tons were under construction for the United States Mail Steamship Co.; one tanker of 1534 gross tons was building for the Standard Transportation Co. Four passenger and cargo vessels were under construction at the Federal Shipbuilding Co. for the Grace line, each vessel being of 11,000 gross tons. The Newport News Shipbuilding and Dry Dock Co. had under construction a total of five vessels. These consisted of two passenger and cargo vessels of 21,900 gross tons each for the Dollar Steamship line, one passenger and cargo vessel of 7500 gross tons for the United Mail Steamship Co., and two passenger and cargo vessels of 5700 gross tons each for the Eastern Steamship lines. The New York Shipbuilding Co. was building two passenger and cargo vessels of 3000 gross tons each for the United Lines, Inc. Four tankers of 9000 gross tons each were under construction at the Sun Shipbuilding and Dry Dock Co. for the Motor Tankship Corp.

New United States Liner to Be Launched Dec. 5

The new liner under construction at the New York Shipbuilding Co. for the United States lines is to be named MANHATTAN and will be launched Dec. 5. This vessel, the largest ever built in an American shipyard, is the first of two 30,000-ton ships to be built by the company.

These vessels are 705 feet long overall, 86 feet molded beam and will have accommodations for approximately 1300 passengers. The vessels will have a sea speed of 20 knots. The MANHATTAN represents an investment of over $10,000,000 of which $9,515,000 will be for the structure and about $750,000 for furnishings and equipment. The new ship is the first built in the United States since 1897 for the North Atlantic trade. She will be christened with water from the 48 states of the Union.

Destroyer Contracts Let

The department of the navy reports that the five destroyers, bids for which were open Sept. 16, were awarded as follows: One each to the New York navy yard, the Boston navy yard and the Puget Sound navy yard; one to the Bath Iron Works Corp. and one to the Bethlehem Shipbuilding Corp. Contracts for all of these vessels except the one at the New York navy yard were signed Sept. 29. The vessel under construction at the New York navy yard was awarded in June. The destroyers at the navy yards are to be completed in 29 months, the one at the Bethlehem yard in 26 months and that at the Bath Iron Works yard in 30 months.

Awarded Repair Contract

Sun Shipbuilding and Dry Dock Co., Chester, Pa., has been awarded the contract for repairs to the United States army dredge RARITAN on a bid of $297,000. The dredge was sunk several months ago in the Narrows, New York harbor, and later raised.

Bids for Two Towboats

Bids for two new Federal Barge line tow boats at a total cost of around $400,000, will be asked shortly.

Chairman Ashburn, of the Inland Waterways Corp. said the boats would be 1000-horsepower each with twin screw diesel engines.

One will be named HUCK FINN and the other TOM SAWYER. The MARK TWAIN is already under construction. The three boats will ply on the lower Mississippi.

Run Successful Trials

The steamship CITY OF HAVRE, fourth ship of the Baltimore Mail line fleet, averaged 18 knots on her trial runs held Oct. 5 off Sandy Hook, according to an announcement by Gaillard F. Ravenel, vice president. THE CITY OF HAVRE entered service Oct. 28, when she sailed from Baltimore, leaving Norfolk the following day for her maiden crossing. Following her sea trials, the vessel was returned to the yards of the Federal Shipbuilding and Drydock Co. at Kearny, New Jersey, for completion of interior furnishing and painting.

Three of the vessels are now in service, the CITY OF HAMBURG having started her initial trip out of Norfolk Thursday, Oct. 1. The fifth vessel of the fleet, the CITY OF NEWPORT NEWS, is scheduled to be delivered in November and will take her place on the sailing schedule Dec. 16.

Bids Opened for Ocean Mail Contract

Bids for the operation of ocean mail route No. 56 between New Orleans and Havana, Cuba, were opened on Oct. 5 in the office of Assistant Postmaster General W. Irving Glover, Washington. The only bid received was from the Seatrain Lines Inc. of New York, and was $4 per nautical mile for vessels of Class 5. If additional vessels are to be used in the service the corporation will supply vessels of Class 6 at $2.50 per mile; vessels of Class 5 at $4 per mile; vessels of Class 4 at $6 per mile and vessels of Class 3 at $8 per mile.

The contract, which is for a 10-year period, will begin on a date optional with the contractor, but not earlier than Jan. 1, 1932, or later than one year from the date of the award of the contract.

The successful bidder will be required to operate in performance of service on this route cargo vessels of Class 5, capable of carrying not less than 90 railroad cars and of maintaining a speed of 13 knots at sea in ordinary weather and of a gross registered tonnage of not less than 6500 tons. The contractor shall construct in American shipyards two new cargo vessels of Class 5, capable of carrying 90 railroad cars and maintaining a speed of not less than 14 knots, with a gross registered tonnage of not less than 6500 tons. The new vessels are to be placed in service not later than the end of the second year of the contract term.

Coast Guard Calls for Bids on Cutter No. 55

The United States coast guard has invited bids for building United States coast guard cutter No. 55. Bids were opened Oct. 30. Cutter No. 55 has the following characteristics: Hull of steel, construction suitable for rescue and assistance work on Lake Michigan.

Length over all, feet, inches....	165	0
Beam, molded, feet, inches	36	0
Depth, molded, to upper deck at side amidships, feet, inches....	21	0
Draft, maximum, feet, inches....	13	0
Displacement, at about 12 feet mean draft, tons		960
Geared turbine drive, single screw		
Shaft horsepower, estimated.....		1500

The cutter will be of steel, of the flush upper-deck design, with ample freeboard and sheer, straight raked stem and conventional cylindrical overhung stern. Vertical bulwarks will surmount the sheer strake forward and aft. The erections above the upper deck will be limited to the extent necessary to house the radio room, galley, boiler casing, engine casing and towing machine inclosure, and to support the bridge and superstructure decks upon which are mounted the wheelhouse and emergency cabin, respectively. The vessel will have two pole masts and one smoke stack; all of the same apparent rake.

There will be two continuous interior decks, the uppermost (main) deck to be watertight for practically its entire length. Similarly, the lower (berth) deck will be watertight throughout its extent forward and abaft the machinery space. The fore-and-aft subdivision will be obtained by means of six watertight and two oil-tight transverse bulkheads extending to the main deck with the exception of the end bulkheads which will extend to the upper deck. The subdivision to be thus obtained will insure a very satisfactory measure of protection in event of collision or grounding damages if any should be encountered.

The cutter has been expressly designed to permit ice-breaking and has been given the cutaway forefoot of the conventional ice-breaking bow. A heavily reinforced cast steel stem has been provided to withstand the direct impact of the vessel on floe or solid ice. In addition, an ice belt of 7/8-inch thickness will extend for the full length of the ship on each side and suitably widened forward to provide for excessive changes in trim while the vessel is breaking solid ice. A forward trimming tank, of ample capacity to secure the desirable immersion of the forefoot for various ice-breaking operations, has also been incorporated in the design. It is intended that the vessel, in the performance of its designated duties, can operate in solid ice two feet in thickness.

The underdeck living spaces have been divided into crew space forward and officers' quarters aft. The intended complement consists of 5 officers, including the commanding officer, and 46 men. Forward spaces in excess of living quarters are to be given over to refrigerated and dry stores, paint and oil. Similarly, aft there has been made provision for miscellaneous clothing, engineers', ordnance, canvas, cabin, and wardroom stores.

The windlass and steering engine will be electrically operated. The automatic towing engine and the gypsy are to be steam-operated.

The main propelling machinery will consist of steam turbines of the impulse, or impulse-reaction type, exhausting into a single pass condenser and driving a single propeller shaft through double reduction gears. The shaft horsepower will be 1500 at a turbine speed not exceeding 7000 revolutions per minute and a corresponding propeller speed of 140 revolutions per minute. Two oil-fired marine water-tube boilers will supply steam at 325 pounds pressure and 200 degrees Fahr. superheat. The boilers may be operated with either natural or induced draft. Engineering auxiliaries will consist of two 25 kilowatt 120-volt direct current turbo-generators, a turbine-driven circulating pump, one 250 gallons per minute turbine driven fire pump, and the required fuel oil, lubricating oil, feed, condensate, sanitary pumps, etc., in accordance with modern engineering practice.

Bids for Cutter No. 55 were to be received until Oct. 30, 1931. It is expected that the successful bidder will immediately begin work on the project. The completion date shall be not later than Oct. 3, 1932. Delivery shall be made to the government either at Buffalo, or any United States port of the Great Lakes west of Buffalo.

Shipbuilders to whom plans and specifications for the construction of Cutter No. 55 have been sent are: American Boiler Works, American Ship Building Co., Bath Iron Works Corp., Bethlehem Shipbuilding Corp. Ltd., Defore Boat & Motor Works, Great Lakes Engineering Works, Carl Hartmann Co., Manitowoc Ship Building Corp., Calumet Shipyard & Dry Dock Co., Brewer Dry Dock Co., Maryland Drydock Co., Mathis Yacht Building Co., Newport News Shipbuilding & Dry Dock Co., Leathem D. Smith Dock Co., Sun Shipbuilding & Drydock Co., Todd Shipyards Corp., United Dry Docks, Inc., Toledo Shipbuilding Co., Spedden Shipbuilding Co. Inc., Buffalo Marine Construction Corp., Marine Iron & Ship Building Co., Warwick Machine Co., Howard Ship Yards & Dock Co., Jeffersonville, Ind.

New England Yards Busy With New Construction

A total of $460,000,000 in contracts for vessels built, started or ordered in 1931, indicates the amount of work at three shipyards in New England. These yards are employing over 8000 men.

The Bath Iron works has sufficient work on hand to keep its 700 employes busy throughout the winter. This yard was recently awarded the contract for building a United States naval destroyer at a cost of $2,626,000. This yard is also building a 165-foot coast guard patrol boat. A number of yachts have been launched at the Bath yards during recent months. These include the CAROLINE for Eldridge Johnson, the SEAPINE for Frank H. Goodyear, the FELICIA for United States Senator Jesse H. Metcalf, the HELENE for Charles Sorenson, and the HALONIA for Charles H. Stone.

The Fore River plant of the Bethlehem Shipbuilding Corp. in Quincy and the Boston navy yard were each awarded one of the new United States navy destroyers. These contracts will keep both of these yards busy throughout the winter. The Fore River yard is building three new liners for the Matson Navigation Co., one of which, the MARIPOSA, entered service. The MONTEREY was launched Oct. 10 and the keel of the LURLINE was recently laid. Also at the Fore River yard the 10,000-ton cruiser PORTLAND is under construction as well as three passenger liners for the United Fruit Co.

Propelling Equipment

A contract for new geared turbine propelling machinery for the three battleships, NEW MEXICO, MISSISSIPPI and IDAHO, was awarded recently to the Westinghouse Electric and Mfg. Co. by the United States navy department at a price of $1,395,632.

The propelling equipment for each battleship consists of four 10,000 shaft horsepower, cross compound impulse reaction turbines with single reduction gears designed for a gear speed of 250 revolutions per minute.

The NEW MEXICO is at the Philadelphia navy yard and the MISSISSIPPI is at the Norfolk navy yard for modernization. The IDAHO was to arrive at the Norfolk navy yard Oct. 1.

Order for Large Oil Barge

The McClintic Marshall Corp. Riter Conley works of Pittsburgh has received a contract from the Atlantic Refining Co. for the construction of one oil tank barge for use in Pittsburgh harbor. The barge, which will be built in the Leetsdale yards, will be 106 feet long, 26 feet wide and 7½ feet deep, with a capacity for 105,000 gallons.

Lay Keel for Third Vessel at Kearny Shipyard

The keel of the third vessel in the Grace line's $17,000,000 shipbuilding program of four sistherships for its Panama Mail line service was laid recently, 30 days ahead of schedule, at the yards of the Federal Shipbuilding Company, Kearny, N. J.

The keel of the first Panama Grace liner was laid at Kearny several months ago, and the big program was officially launched last month when Governor Morgan F. Larson of New Jersey dove the first rivet of the second keel.

Designed to be among the most luxurious liners ever built in American yards, the four vessels will have among their notable features a private bath for every stateroom. Others include outdoor swimming pools and space for out door dancing.

The four vessels, which will accommodate 300 first class and sixty-four third class passengers, are especially designed for service between New York, Central America, Mexico and California.

Maiden Voyage in June

June 25 is the date set for the maiden voyage of the new White Star line motorship GEORGIC from Liverpool to New York, according to the 1932 sailing schedule just received at the New York office of the line from London.

This date will also mark the second anniversary of the maiden voyage of the BRITANNIC, the White Star line's first motorship and the largest cabin liner in the world.

The GEORGIC, which is to be launched Nov. 12 at the Harland and Wolff yards at Belfast, is a sistership of the BRITANNIC and will be operated in the same service.

Plane Carrier Sets Record

The 896-foot turbine electric airplane carrier LEXINGTON recently established a speed record for ships of her size on a run from the Bremerton navy yard to San Pedro, Calif.

A maximum speed of 33.7 knots or 41 miles per hour was reached, a speed that can be maintained while the ship is on long cruises except in tropical waters. A total of 180,965 horsepower, or more than enough to supply the electrical needs of a city the size of Los Angeles was generated by the four 32,500-kilowatt General Electric turbine generators.

Launch Second New Liner At Fore River Shipyard

The $8,500,000 steamship MONTEREY, second of three liners building at the Fore River plant of the Bethlehem Shipbuilding Corp. for the Matson Navigation Co. was launched Oct. 10. The first vessel in the Matson building program, the MARIPOSA, was launched in July. The keel of the third vessel, the LURLINE, was laid recently.

The MONTEREY is 632 feet long overall, 79 feet beam, 28-foot draft, 26,000 tons displacement and will have a top speed of 20½ knots. Accommodations will be provided for 475 first class, 230 tourist passengers and the vessel will carry a crew of 390. A description of the MARIPOSA, sistership of the MONTEREY and LURLINE, appeared in the July issue of MARINE REVIEW.

Guests present at the launching were: Mrs. E. Faxon Bishop of Honolulu, sponsor of the vessel; E. Faxon Bishop, director of the Matson company; W. F. Roth, president of the Matson Navigation Co., and Mrs. Roth; Commissioner S. S. Sandburg of the shipping board; Capt. Elmer E. Crowley, president of the Emergency Fleet Corp.; D. M. Dow, commissioner for Australia in the United States; G. E. Nichols, assistant to vice president, Matson Navigation Co.; F. J. Gauntlet, Washington representative Matson Navigation Co.; James French, chief of Lloyds register of shipping, New York; W. L. Bunker, vice president, United States lines; Mayor James M. Curley, Boston; Capt. E. E. O'Donnell, president Eastern Steamship lines; Admiral L. M. Nulton, commandant of the Boston navy yard.

First Voyage in December of Turbo-Electric Ship

On Dec. 23, the TALAMANCA, first of six new turbo-electric liners of the United Fruit Co., will sail from New York on a 22-day maiden voyage to San Francisco via the Panama canal. She will stop at Miami, Havana, Kingston, Jamaica (for New Year's eve festivity at the Myrtle Bank Hotel), the Panama Canal Zone, Los Angeles and San Francisco. She will then go into regular service between San Francisco and West Coast ports of Central America. The TALAMANCA, which will carry about 100 passengers, was built by the Newport News Shipbuilding & Drydock Co. and incorporates all the latest features making for comfort in tropical waters. Two special features are a glass-enclosed promenade forward and a permanent outdoor swimming pool.

Bids for Inspection Boat

Sealed bids, in duplicate, will be received until 3 p. m., Nov. 16, 1931, and then publicly opened, for furnishing all labor and materials and performing all work for constructing and delivering afloat one diesel, twin screw inspection boat.

Doctor George B. Karelitz, formerly manager of the mechanics division of the Westinghouse research laboratory in East Pittsburgh, has been appointed division engineer in charge of transportation at the South Philadelphia works of the Westinghouse Electric and Mfg. Co. His duties will include supervision of the manufacture of marine appartus, diesel oil engines and other equipment. R. E. Peterson, research engineer, will succeed Dr. Karelitz as manager of the mechanics division of research.

LaMonte J. Belnap has been elected chairman of the executive committee of the Worthington Pump & Machinery Corp., Harrison, N. J. Mr. Belnap is succeeded as president by H. C. Beaver, formerly vice president.

Bunker Prices

At New York

	Coal alongside per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Oct. 18, 1931	4.75@5.00	.65	3.25
Sept. 18,	4.75@5.00	.75	3.47½
Aug. 18	4.75@5.00	.75	3.47½
July 18	4.75@5.00	.85	3.72½
June 18	4.85@5.25	.90	3.84½
May 18	4.85@5.25	1.00	4.08
April 18	4.85@5.25	1.10	4.32
Mar. 18	4.85@5.25	1.10	4.55½
Feb. 18	4.85@5.25	1.10	4.55½
Jan. 18	4.85@5.25	1.10	4.55½
Dec. 18, 1930	4.85@5.25	1.10	4.55½

At Philadelphia

	Coal trim in bunk per ton	Fuel oil alongside per barrel	Diesel engine oil alongside per gallon
Oct. 18, 1931	4.75@5.00	.75	3.45
Sept. 18,	4.75@5.00	.75	3.45
Aug. 18	4.75@5.00	.75	3.45
July 18	4.75@5.00	.85	3.70
June 18	4.85@5.25	.90	3.80
May 18	4.85@5.25	1.00	4.4
Apr'l 18	4.85@5.25	1.00	4.60
Mar. 18	4.85@5.25	1.00	4.88
Feb. 18	4.85@5.25	1.00	4.88
Jan. 18	4.85@5.25	.85	4.88
Dec. 18, 1930	4.85@5.25	.95	4.88

Other Ports

Boston, coal, per ton	$6.44
Boston, oil, f. a. s., per barrel	0.87
Hampton Roads, coal, per ton, f.o.b., piers	$4.35 to 4.50
June 9—Cardiff, coal, per ton	13s 6d
London, coal, per ton	—s —d
Antwerp, coal, per ton	18s 9d
Antwerp, Fuel oil, per ton	67s 6d
Antwerp, Diesel oil, per ton	82s 6d
British ports, Fuel oil	67s 6d
British ports, Diesel oil	82s 6d

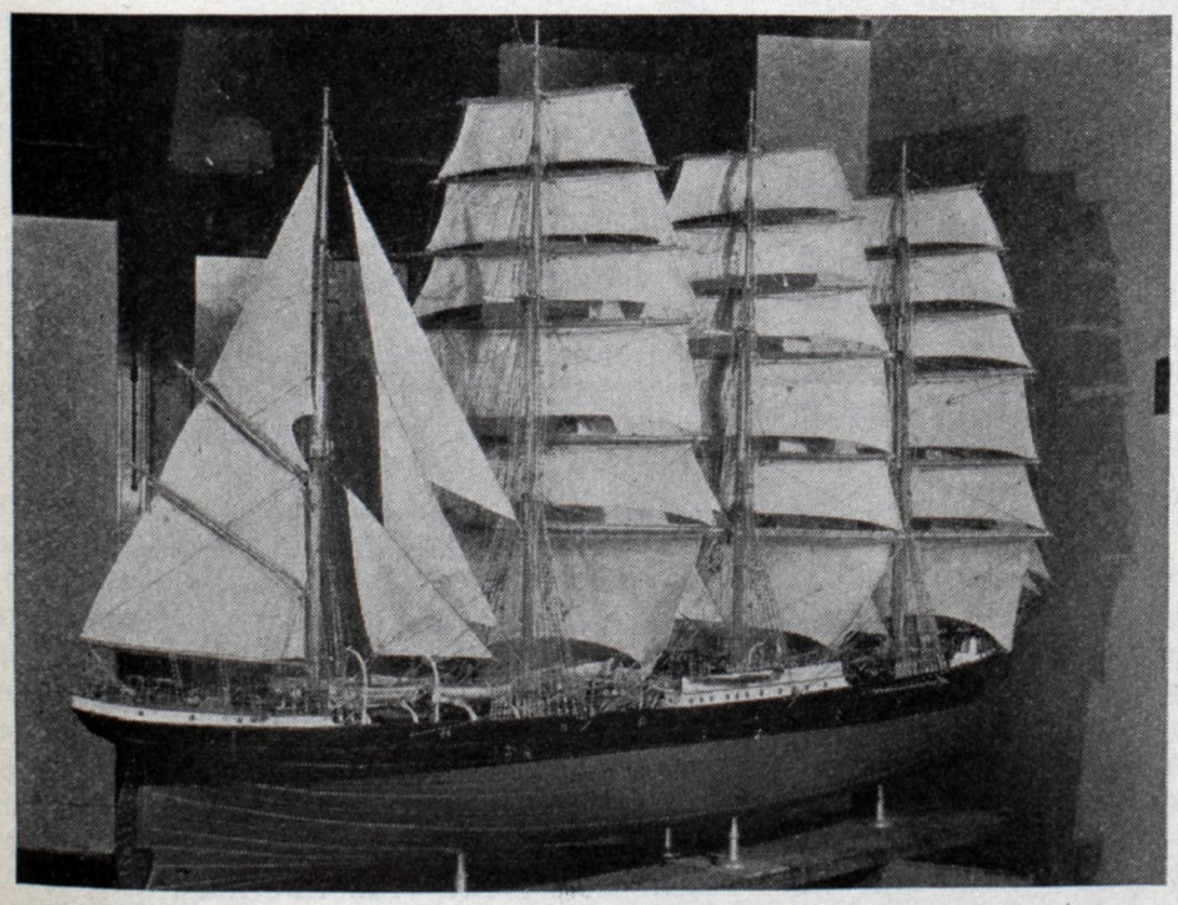
Exhibits Show Development of Water Transportation

THE Museum of Science and Industry, founded by Julius Rosenwald in Chicago, has recognized the importance of water transportation as an agent of civilization by providing approximately 22,000 square feet of its floor space for depicting the developments of shipbuilding and navigation. This space is being divided into twelve sections, as follows: Primitive craft, evolution of the sail ship, evolution of the merchant steamer, development of lake and ocean freighters, inland water transportation, shipbuilding, development of ship propulsion, ship interiors and interior equipment, deck and miscellaneous accessories, navigation, marine industries, pleasure craft, yachts, etc.

In the presentation of over 225 models which will comprise the various exhibits, modern ideas in museum setting will be carried out to the full extent. Many of the exhibits will be so arranged that they may be operated by the visitor. For instance, a model of the six-masted schooner WILLIAM L. DOUGLAS will be mounted on a marine railway which will travel back and forth so that the visitor may see just how vessels are hauled out on such railways for under-water repairs. Likewise a floating dry dock will rise and lift a steamship out of the water or lower it to floating position. Models of various life saving devices will likewise be operated by the visitor and numerous dioramas will educate him in the differences between the methods of towing on the Mississippi river and the deep-water towing along the Atlantic coast.

There will be a full-sized replica of a small sailing ship on which the visitor may go aboard to see how the sailor lives surrounded by the various equipment to be found in the fo'castle. There will be a pilot house in which the visitor may simulate the steering of a ship by turning the steering wheel which will cause reactions similar to those of a ship responding to the helm.

The marine section of the Museum of Science and Industry is under the curatorship of Major Carlos de Zafra, formerly consulting naval architect with the late Charles L. Seabury, who has had considerable experience in maritime displays and who has secured a leave of absence from the engineering department of the New York university to give his entire time to the planning of this section of the museum.



Four-masted bark Pamir. Model constructed in shops of the Museum of Science and Industry, Chicago. Scale ¼ inch to 1 foot

Enters Equipment Field

A. P. Homer, widely known in marine and naval circles and formerly general manager of the Charles Cory Corp., recently joined the Pollak Mfg. Co., Arlington, N. J., fabricator of stainless steel and aluminum, as manager of the marine department.

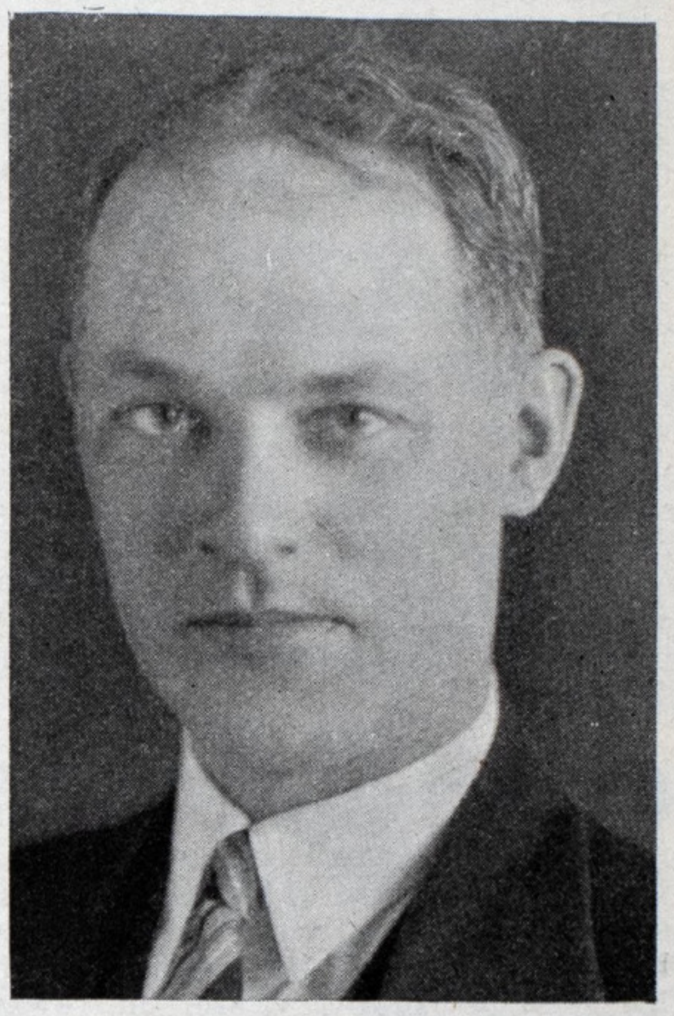
Mr. Homer is a graduate engineer of the University of Texas and began his shipbuilding experience in 1901 with the New York Shipbuilding Co. From 1903 to 1907 he was with the Fore River Shipbuilding Co. and then joined the Submarine Signal Co., resigning in 1914 to act as special aide to Assistant Secretary of the Navy Franklin D. Roosevelt.

For the past eight years the Pollak Mfg. Co. has been building equipment for the navy department and now plans to enter the marine field with a complete line of electric and mechanical telegraphs and a general line of marine equipment for both naval and commercial vessels.

George J. Remington, formerly assistant operating manager for the shipping board and later connected with the Texas Co., died in San Francisco on Oct. 12. Mr. Remington had been general superintendent of the Union Oil Co. of California for the past few years and had a wide circle of acquaintances among shipping men.

Former District Engineer Becomes Port Director

MAJOR RUFUS W. PUTNAM, former United States district engineer in the Chicago territory, has been appointed director of the Chicago regional port commission which recently was authorized to function by the legislatures of Illinois and Indiana. Major Putnam will have executive charge of the commission's work and is well qualified for the post, being well versed in marine and transportation terminal affairs in the Chicago district and in general. He is author of the harbor plan of Chicago which was drafted under the auspices of the Commercial club at the request of the city government in 1926 and has served in an advisory capacity for many years.



Major R. W. Putnam

The work of the commission embraces harbor development from Waukegan to Michigan City and the whole metropolitan area down to Joliet and a co-ordination of the various projects. Terminal facilities, both rail and water, form another branch of the work. One of the major tasks of the commission will be to draft a law under which a permanent interstate port authority can be constituted by Illinois and Indiana, to have jurisdiction over a harbor district bounded by the Lake Michigan shore line between Waukegan and Michigan City and an imaginary line connecting Waukegan, Elgin, Aurora, Joliet, Chicago Heights, LaPorte and Michigan City. The nature of this contemplated port authority would be similar to those operating in New York, New Jersey and New Orleans.

Members of the commission are: W. R. Dawes, president and chairman; Major Rufus W. Putnam, director; E. M. Antrim, F. L. Bateman, J. T. Pirie and W. J. Riley.

Late Decisions in Maritime Law

Legal Tips for Shipowners and Officers

Specially Compiled for Marine Review
By Harry Bowne Skillman
Attorney at Law

FAILURE to comply with the terms of inspectors' certificate regarding the crew of a tug would subject those responsible for the irregularity to penalties, it was held in the case of Hartford & New York Transportation Co. v. Rogers & Hubbard Co., 47 F. (2d) 189, but would not necessarily render the vessel unseaworthy. Seaworthiness in respect to the crew, it was said, depends on whether the personnel is competent to perform maritime services and not on certificates. A shortage of one man in the tug's crew comprised of ten men was held not to render the tug and barges in tow unseaworthy.

* * *

QUOTING from the case of KEKOSKEE, 47 F. (2d) 235: "The purpose of salvage is compensatory, to inspire the saving of property and inspire the assumption of risk perhaps beyond the duty of life; and this service must be voluntary, and the reward must be sufficiently large to inspire salvors to take the required risks." The award in the case to participating members of the crew (the captain was absent) was in equal portions. The court said: "The risk was to life or serious injury, and this was equal, and the recovery should not be in proportion to the wages received."

* * *

CONGRESS has exclusive authority to legislate in matters of admiralty and maritime jurisdiction.—Great Lakes Dredge & Dock Co. v. Brown, 47 F. (2d) 265.

* * *

SAID the court in the case of SHOWBOAT, 47 F. (2d) 286: "Here we have a 5-masted schooner, which, if the sails which are now on board were bent on, the booms being arranged to swing over the house, could go to sea; or she could be towed as she now is anywhere that a barge can be taken. She has a crew consisting of a licensed master or mate and two or three seamen. Her mooring lines and chains can be readily cast off; and the electric wires are so fitted as to be easily detachable. While the owners had not, at the time, when the libel was filed, any present intention to use her for transportation purposes, * * * she was still a "vessel" * * * within admiralty jurisdiction." The schooner, it appeared, was tied to a wharf and was used for restaurant and dancing. It was held that fixtures and furnishing which became an integral part of the vessel, and portable fire extinguishers sold conditionally for use on the vessel, were subject to maritime liens as part of the vessel, but that furnishings used merely in the vessel's restaurant and dance hall were not such part of the vessel to postpone conditional vendor's title to maritime liens.

* * *

THE owner of an arrested vessel is not compelled to bond her or file a stipulation for value. He may let her lie until the final decree, and, if she is held liable, let her be sold. But usually an arrested vessel is released on a stipulation for value covering the amount named in the libel, with interest. A stipulation for value is an agreement with the court by the claimant involving the substitution by the claimant of a choice in action against himself as the res to take the place of the vessel sued in rem. A vessel released on a stipulation for value cannot be rearrested for the cause of action therein stated. Such a stipulation is like any other contract. It is based on a consideration, the release of an arrested vessel, or the undertaking not to arrest a vessel against which a claim in rem is pending. It means to the shipowner the freedom of his ship and to the libelant a new security of unfluctuating value in the place of the vessel. It cannot, therefore, be lightly set aside. A unilateral mistake, such as a statement of the libelant's claim at too small a figure, is not a reason for so doing.—J. K. Welding Co. v. Gotham Marine Corp., 47 F. (2d) 332.

* * *

A CONFESSION by the captain that his vessel was a rumrunner justified her seizure and made a search unnecessary just as a plea of guilty justifies a sentence and makes a trial unnecessary. "The reason for this," said the court in the case of SEBASTOPOL, 47 F. (2d) 336, "is of course, that, by his confession, the suspect * * * definitely elects not to stand on his constitutional rights, and so expressly waives them. Surely after such a confession as was here made the most enthusiastic champion of the bill of rights would not seriously contend that a government officer engaged in law enforcement should at once withdraw on constitutional grounds and seek a search warrant from the nearest United States commissioner. As Judge Coleman aptly remarked in another connection where a claim of illegal search had been put forward, 'Common sense is not barred by the fourth and fifth amendments.'"

* * *

THE case of PONTIN BROTHERS, 47 F. (2d) 595, presented facts showing that a deck hand on a lighter had been negligently injured to such an extent that amputation of one of his legs between the ankle and knee was necessitated. He was 28 years old, his expectancy according to the American experience table of mortality was 36.73, and he was earning $80 a month and his board. He suffered severe pain, and, due to the impinging of nerves in the scar tissue formed when the leg was amputated, the stump was painful and would be painful until release of the nerves; another operation was perhaps necessary. He was a young man whose ability to earn money was dependent upon his physical ability to do manual labor. "All this, with the earnings he has lost and the suffering he has endured in the past," said the court, "leads us to the conclusion that the award ($11,000) was too low," and the court increased the amount to $16,000.

* * *

FORFEITURE, under the tariff act, of a vessel importing liquor, does not bar a prosecution of the captain and mate under the national prohibition act.—Awalt v. United States, 477 F. (2d) 47.

* * *

IN THE case of North & East River Steamboat Co. v. Jay Street Terminal, 47 F. (2d) 474, it appeared that a steamer was going up the East River on a strong ebb tide. Two tugs with their respective tows were coming down the river on the inside of the steamer, indicating an apparent starboard to starboard passing. However, the steamer blew one blast of her whistle, thereby indicating a port to port passing. Shortly after an exchange of whistles, the steamer made a wide sheer to her starboard in order to go into a pier, thereby bringing the steamer directly across the bows of the two tugs, a careless thing to do. The court held that the steamer was negligent and liable for damages caused.

* * *

THE question before the court in the case of O'Boyle v. United States, 47 F. (2d) 585, was whether under the terms of the charter party the charterer had shown any excuse for failing to return a barge "in the same condition as received." The barge was old, yet apparently seaworthy, at the time she was chartered. More than two months afterward she leaked and sank while in posession and under the control of the charterer. "In such circumstances," said the court, "the latter had the duty of offering evidence to show that the barge was properly cared for while in its hands, or met with some strain, not due to its neglect, which caused her to leak." The court held that not only was the failure to turn over the barge "in the same condition as received," according to agreement, not excused by any proof of unseaworthiness when chartered, but that the presumption of negligence, arising from the foundering of an initially seaworthy vessel, was not met.

Marine Business Statistics Condensed

Record of Traffic at Principal American Ports for Past Year

New York

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	523	2,724,761	522	2,641,711
August	541	2,785,703	531	2,739,919
July	538	2,626,814	563	2,754,107
June	541	2,747,134	526	2,596,749
May	478	2,434,601	511	2,542,351
April	496	2,538,201	527	2,656,992
March	494	2,396,654	489	2,323,422
February	439	2,127,771	484	2,261,468
January	486	2,417,338	542	2,533,711
December, 1930....	539	2,497,454	521	2,454,917

Philadelphia

(Including Chester, Wilmington and the whole Philadelphia port district)
(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	66	172,313	54	155,113
August	81	208,854	59	147,948
July	76	201,677	59	155,114
June	75	218,611	50	127,906
May	82	235,108	62	170,497
April	68	189,113	51	136,433
March	65	198,848	46	116,786
February	69	200,212	53	163,134
January	70	227,146	49	158,570
December, 1930....	80	206,778	55	144,471

Boston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	109	339,482	78	263,783
August	131	388,799	98	305,488
July	131	362,111	94	290,733
June	130	347,787	97	264,467
May	108	311,171	91	293,146
April	107	292,403	89	233,756
March	97	279,797	66	243,377
February	76	259,402	57	190,598
January	76	245,382	49	195,091
December, 1930	91	287,347	50	174,971

Portland, Me.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	27	48,534	26	52,035
August	29	50,249	23	39,273
July	24	52,979	22	52,945
June	17	28,216	17	26,397
May	12	20,821	11	22,573
April	11	30,000	10	25,765
March	6	20,081	7	20,122
February	18	48,722	15	45,664
January	14	40,247	15	46,602
December, 1930....	23	55,605	23	60,126

Providence

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	6	20,330	3	11,160
August	10	41,671	3	12,240
July	6	25,062	7	30,748
June	6	21,104	3	12,211
May	9	37,120	2	8,674
April	8	32,848	6	25,101
March	5	18,288	4	17,400
February	9	43,707	8	30,036
January	8	28,019	5	15,335
December, 1930....	9	36,380	6	25,318

Portland, Oreg.

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	111	350,556	117	362,970
August	29	114,582	31	119,968
July	28	107,694	48	174,226
June	30	116,953	35	139,799
May	24	94,695	39	142,847
April	26	104,099	36	141,036
March	41	158,869	46	173,220
February	24	95,726	43	175,697
January	29	119,686	47	192,455
December, 1930....	27	107,300	52	197,628

Baltimore

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	111	350,556	117	362,970
August	122	374,434	118	377,085
July	125	393,553	120	379,526
June	127	376,049	114	338,066
May	110	353,301	118	368,874
April	131	409,907	139	420,594
March	123	385,514	107	336,157
February	99	327,516	106	340,771
January	121	386,924	127	412,306
December, 1930....	120	390,126	127	429,048

Norfolk and Newport News

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	24	72,333	47	104,255
August	21	59,408	54	127,864
July	31	77,082	63	149,665
June	39	108,710	59	167,488
May	22	63,739	49	140,356
April	14	31,959	40	116,565
March	19	47,982	52	137,616
February	15	43,123	46	116,116
January	21	57,883	61	170,594
December, 1930....	44	92,341	63	174,384

Jacksonville

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	6	12,463	8	18,888
August	21	61,439	24	70,922
July	9	18,703	5	9,297
June	11	24,902	13	24,517
May	8	21,046	7	11,045
April	15	31,901	5	10,614
March	10	17,299	6	7,839
February	7	18,934	9	20,915
January	14	28,243	10	15,617
December, 1930....	17	33,862	16	29,847

Key West

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	36	54,012	35	55,610
August	37	56,505	37	56,505
July	39	59,268	41	62,526
June	63	81,660	63	86,349
May	83	91,683	80	90,758
April	60	55,493	51	54,656
March	60	69,731	56	72,956
February	61	70,169	56	69,443
January	61	82,218	57	30,394
December, 1930....	56	71,327	56	75,588

Mobile

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	104	213,204	102	226,192
August	113	217,541	97	194,678
July	101	229,960	92	212,634
June	88	197,952	93	217,151
May	103	194,198	93	194,198
April	107	251,402	108	242,685
March	109	232,778	102	229,966
February	93	222,163	86	206,376
January	112	282,874	111	249,375
December, 1930....	91	208,802	84	194,477

Seattle

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	52	229,687	50	217,517
August	48	202,879	51	213,091
July	46	207,651	50	222,816
June	52	220,915	52	223,750
May	43	185,945	43	184,118
April	50	214,534	48	210,117
March	47	207,105	49	212,237
February	48	212,187	53	233,121
January	54	238,037	60	266,744
December, 1930....	56	240,203	61	256,724

New Orleans

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	.....	.....	.....	.....
August	179	484,245	172	474,230
July	184	539,810	172	509,475
June	193	561,399	190	562,090
May	185	532,046	192	551,459
April	195	576,251	181	536,678
March	185	545,474	188	537,148
February	159	499,643	172	537,813
January	207	610,472	190	548,267
December, 1930....	203	602,527	197	578,723

Charleston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net. tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	16	29,428	11	19,111
August	9	18,293	7	6,274
July	13	26,985	10	20,974
June	10	23,571	9	21,074
May	9	16,418	7	11,884
April	17	45,890	19	50,033
March	15	36,938	12	27,110
February	14	33,837	16	37,092
January	20	47,834	21	49,516
December, 1930....	22	62,668	23	66,852

Galveston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	27	63,896	99	320,127
August	39	85,793	79	234,583
July	46	107,008	75	226,381
June	35	66,342	73	205,074
May	27	53,091	69	191,632
April	26	62,924	68	210,315
March	25	39,536	69	205,341
February	23	40,825	71	209,057
January	25	45,442	84	260,555
December, 1930....	40	97,907	91	282,726

Los Angeles

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	199	580,683	196	593,882
August	199	673,223	204	676,036
July	170	622,694	176	636,440
June	179	659,029	149	568,208
May	210	696,717	194	731,392
April	225	644,178	209	626,590
March	224	602,763	210	623,023
February	181	557,981	196	561,570
January	191	673,620	193	753,720
December, 1930....	227	654,598	184	596,347

San Francisco

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	.....	.....	.....	.....
August	140	636,189	160	665,108
July	173	743,588	155	679,657
June	159	663,047	155	634,838
May	161	658,525	163	676,789
April	158	733,902	170	702,433
March	156	642,924	139	544,316
February	142	577,019	143	581,775
January	165	685,851	172	721,042
December, 1930....	154	646,767	174	689,358

Houston

(Exclusive of Domestic)

Month	—Entrances— No. ships	Net tonnage	—Clearances— No. ships	Net tonnage
September, 1931....	34	132,684	45	163,144
August	31	127,112	44	163,103
July	35	148,988	45	178,091
June	23	115,140	38	139,102
May	23	101,100	39	152,690
April	32	125,007	47	177,058
March	24	106,838	32	131,470
February	30	130,544	38	152,347
January	26	111,047	37	140,860
December, 1930....	35	143,585	47	185,757

Note: The figures given in this table are for direct entrances and clearances. Additional vessels in foreign trade enter and clear from and to other American ports after original entry and before final departure. At the port of Philadelphia, for instance, additional vessels in the foreign trade in this category were 52 of 174,655 net tons entered and 58 of 189,569 net tons cleared for the month of September.

Modern Stevedoring and Dock Management

Practical Ways to Cut Costs in Cargo Handling

How to Improve Service to Ships

Conducted by H.E.Stocker

Costs Cut in Half by Better Methods and Use of Suitable Equipment

By H. E. Stocker

THE Belgian line pier at Erie basin, Brooklyn, N. Y., has been the scene of a good job in reducing cargo handling costs during the past four years. Capt. G. S. Voigt, superintendent of the pier and in charge of stevedoring operations, and his assistant, Edward Quinn have reduced costs 50 per cent in the last four years by good management and by the extensive use of gasoline propelled tractor cranes.

When Captain Voigt took over the operations at Pier 2, all of the work was handled with two wheeled hand trucks. The first equipment acquired were two gasoline tractor cranes. The crane equipment was increased gradually until today thirteen cranes are owned by the company, and more are rented when the activity on the pier requires it.

The 50 per cent reduction in costs was the result of increasing slingloads and handling the larger units on the terminal with the cranes. The commodities handled consist of automobiles, linseed cakes, apples, apple peelings, canned goods, tires, iron, steel of many kinds, machinery and bulk grain. Ninety per cent of all the dock freight is handled with cranes. Steel is landed on four wheel trucks at shipside and hauled to the pile on the "farm" by one of the cranes acting as a tractor. When handling long steel, one end is landed on a dolly and as the winchman lowers away, the dolly is guided into the shed. When the middle of the sling load is a few feet from the floor, a four wheel truck is shoved under it and the load is landed. The truck is hauled away by a crane.

When working across the pier approximately 70 tons per hatch hour can be handled. On one day, 84 tons were discharged to the dock in one hour and a quarter.

Steel is taken out of the ship and landed to the "farm" at a rate of 35 tons per hatch hour. The largest haul in this operation is one quarter of a mile.

Before Captain Voigt took over the Belgian line operation, the average for a ship was seven to eight tons per hatch hours.

On Handling Long Steel

Long steel handling in the hold is facilitated by providing an extra block on the boom and tackle operated by the head of the offshore winch. This gear is used to lift pieces of steel to get slings into position for hoisting from the hold.

When steel is brought to the pile on a four wheel truck, the load is placed on the ground or on the pile by one or two cranes stationed regularly at the pile. Long steel is handled by two cranes each taking hold of one end of a sling load. The new heavy duty cranes can do this job alone, having a capacity of five tons. The other cranes have a capacity of three tons. The particulars of the latest crane acquired follow:

General Dimension of Crane

Width over all, inches	65
Length over all, feet	12
Height over all (less boom) ft. in.	8 9
Height over all (boom lowered) feet	10
Height over all (boom raised to its highest position) feet from	14 to 18
Boom heights from 10 feet to 16 feet from center of hook to ground.	
Boom reaches from 2 feet to 10 feet from front bumper to center of hook.	
Turning radius, feet from	14 to 15
Capacity 3½ tons. (Lifts and carries up to 5 tons.)	
Total weight approx., tons	5½

Tractor cranes are also used by the truckmen in loading steel from the pile to trucks. The use of cranes greatly facilitates the loading of the trucks. When hand labor alone was used, it took two and one half to three hours to load a truck load of steel. Three men working with cranes can do this work in about twenty minutes.

The Belgian line has made an excellent record in handling imported plate glass. They have reduced damage to plate glass to the minimum by careful stowage and handling. In handling the glass, a draft is hoisted overside and is held suspended in the air while a sling, from one of the dock cranes, is attached. The crane then takes over the slingload and the ship's gear is released. All of the

cases are stowed on the dock in upright position and are carefully shored up to prevent their falling over. This method of handling makes it possible to discharge an average of twenty-two tons per hatch hour.

Shippers' trucks are loaded with cases of plate glass by the same type tractor cranes that handle the cases from shipside. The crane at the pile picks up a case of plate glass with hooks that engage the top part of the case, raising it about four feet off of the floor. It then backs far enough away so that the shipper's truck can be backed into the space between the crane and the pile in such a manner that the case clears the side of the truck. The case is then landed on the truck floor. The truck is backed from the opposite direction when cases are placed on the other side.

Belgian brick, which is shipped loose, is handled in boxes and is carried from shipside to the "farm" by means of lift trucks operating with lift platform bodies.

Outward cargo is handled by cranes using platform slings for cased goods such as canned fruits and vegetables. The slingloads are made up at the pile by two men and are carried to the ship by a crane.

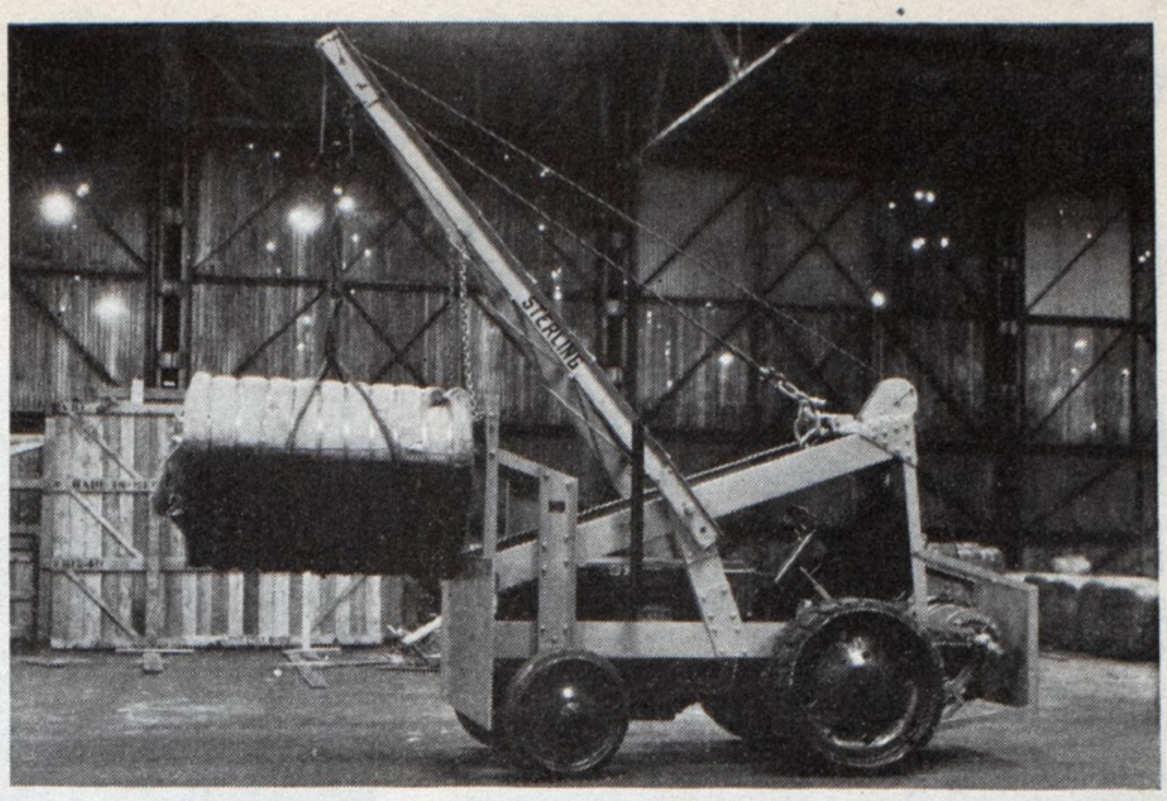
Large quantities of apples are shipped out on the Belgian line steamers. These are handled with a platform sling, twenty barrels at a time. At one time 800 barrels weighing 160 pounds each were loaded in one and three quarter hours.

One of the results of the tractor crane method of cargo handling has been economy of dock space because the cranes can pile cargo high at a low cost per ton. This, together with the faster handling of motor trucks also made possible by working with the cranes, has increased the annual tonnage capacity of the terminal.

One of the achievements of the Belgian line pier in the past four years has been a large reduction in insurance premiums. This is an example of direct money saving through a proper handling of this part of a terminal operation.

Altogether this operation is a good example of the economies and other benefits that can be effected by an executive who has, not only years of experience, but an open mind.

Tractor cranes handle a great variety of commodities at a low cost per hour



Committee on Merchant Marine Holds Meeting

The second meeting of the National Standing committee on the merchant marine was held in Washington on Oct. 6 having been called by Chairman T. V. O'Connor of the shipping board, who is also chairman of the Standing committee.

Reports were submitted by subcommittees appointed at the first meeting held on April 24, 1931, and included subjects as follows: Methods of increasing patronage for American ships; adequate mail pay for high speed ships; safety of marine workers; Panama canal tolls and measurement; safety of life at sea; proposals of railroads for ownership of water carriers and regulation by Interstate Commerce commission; construction of naval vessels in private American yards; cost differential in operation of United States versus foreign ships. After discussion the reports were adopted.

The committee also adopted resolutions advocating abolition of the army and navy transport systems and the Panama Railroad Steamship line; tax exemption on American vessels operating in foreign trade, provided the deductions on taxable incomes derived from operating profits are devoted to new construction in American yards; and restrictions on foreign vessels departing from American ports on cruises to "nowhere."

The next meeting of the Standing committee will be held on Dec. 3, 1931, when reports will be received from sub-committees on government aid to cargo ships not benefitted by mail contracts and foreign competition in indirect trade, which reports were not completed in time for presentation at this meeting.

Members of the Committee who attended were: T. V. O'Connor, chairman, United States shipping board; H. B. Walker, president, American Steamship Owners' association; H. Gerrish Smith, president, National Council of American Shipbuilders; Geo. A. Marr, vice president, Lake Carriers' association; Robert C. Tuttle, manager marine department, Atlantic Refining Co.; Malcolm M. Stewart, chairman, Middle West Foreign Trade committee; Joseph T. Lykes, president, Lykes Brothers Co.

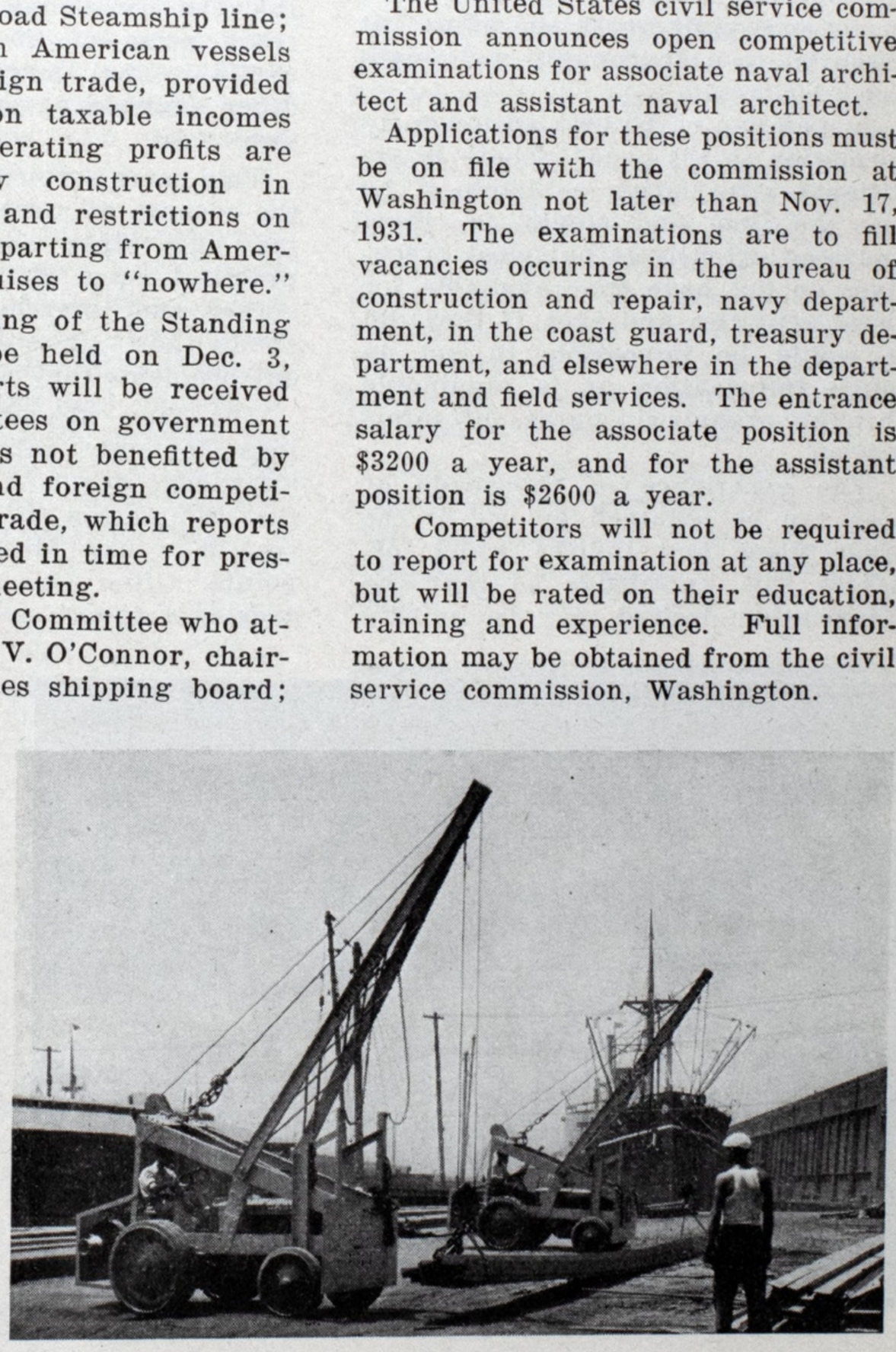
Civil Service Examinations For Naval Architects

The United States civil service commission announces open competitive examinations for associate naval architect and assistant naval architect.

Applications for these positions must be on file with the commission at Washington not later than Nov. 17, 1931. The examinations are to fill vacancies occuring in the bureau of construction and repair, navy department, in the coast guard, treasury department, and elsewhere in the department and field services. The entrance salary for the associate position is $3200 a year, and for the assistant position is $2600 a year.

Competitors will not be required to report for examination at any place, but will be rated on their education, training and experience. Full information may be obtained from the civil service commission, Washington.

Many uses are found for tractor cranes. In this instance two of the cranes are used on the "farm" in placing steel in piles



Organized Knowledge Paves the Way to Profits

ORGANIZED knowledge is necessary if a thorough analysis of a problem is to be made. All factors involved in a problem must be considered if accurate conclusions are to be obtained. Cargo handling operations planned on a basis of incomplete knowledge as to methods, types of equipment and the mechanical details of equipment, will not achieve as profitable results as when all this information is obtained. When a problem is studied in this manner, the facts needed cannot be obtained without the aid of organized sources of information, except with the expenditure of time and money which is not always justified by the results obtainable.

In modern America there are many organized sources of information in the way of engineering indices, the trade press, books, associations and institutes and government bureaus that must be utilzed if the best results are desired. Modern American business experience has proved conclusively that availing oneself of these organized facts is not only well worth the effort but essential to a thoroughly well managed business.

A man can carry only so much information in his head. There is additional information available if he has the time and money to travel and read extensively but most executives do not have time available for these activities and even if they did it would be impossible to get as much information as is obtainable through organized sources of information.

The experience of thousands of men can be obtained by use of the trade press and indices which organize this knowledge so that the information desired may be quickly located. The American Society of Mechanical Engineers has a system of card indices covering thousands of magazines in many languages so that the knowledge contained in the trade press of the world is made available on cargo handling and other engineering subjects at a very small cost.

New Types of Gear are Constantly Developed

This same service makes available the records of meetings of engineering and other associations where practical men of industry get together and interchange information about their experiences in working out problems they have had to solve.

The men attending these meetings not only gain in the specific knowledge acquired but gain also in the stimulation of the mind which results in new ideas and new viewpoints. Often this result is of far greater value than specific facts obtained at a meeting. An incorrect viewpoint of the cargo handling problem is the chief obstacle to a more rapid progress. The methods and equipment, and the men to put these into effective use are available, but the unprogressive viewpoints of executives prevent this profitable result. It is particularly important in times of depression that viewpoints be changed so that modern methods and equipments and modern minded executives be permitted to cut costs and create profits.

Knowledge is power and the more complete the knowledge the greater the power for profit, provided the acquisition of knowledge and its use is directed by those who understand the value of knowledge with respect to the problem at hand. Some engineers and some business executives will carry studies of a problem far beyond the point justified by the economic value of the results obtainable. The relationship of time and money expended must be considered always, in relation to the results in dollars.

Progress in cargo handling can be accelerated by a greater use of organized sources of information now available but the use of this available information and the stimulation of new viewpoints, rests to a large degree on the utilization of associations, for the interchange of information and ideas. There are organizations of executives in existence that can be utilized in this manner. The success of similar organizations in other lines of activity and the need for a greater acceleration of cargo handling progress in times of depression make it important that something be done now and justifies any expense commensurate with results obtainable.

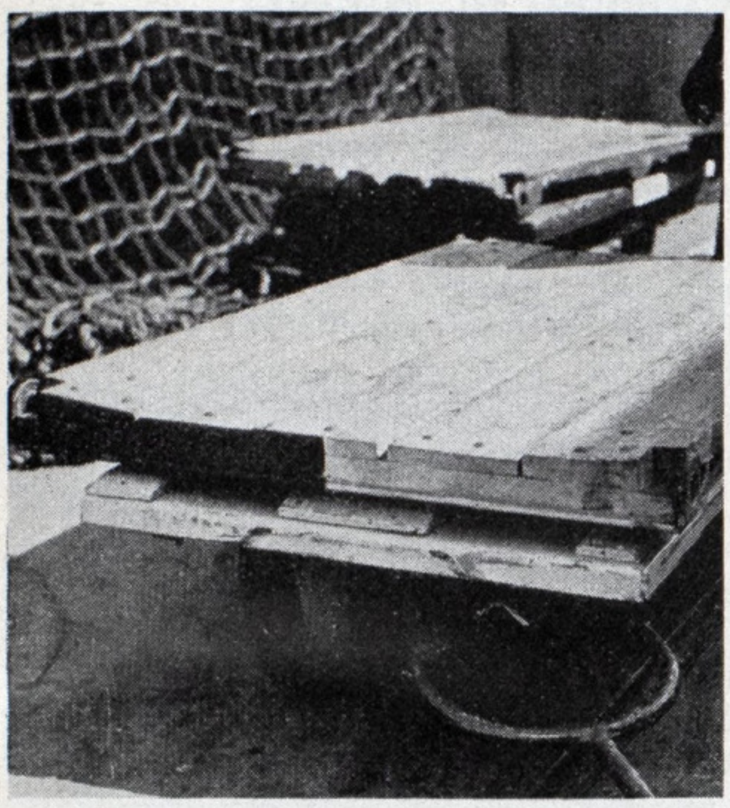
Use of skid platforms for handling cargo has grown because progressive executives use organized knowledge to cut costs.

Study Towboat Design

The mechanical section of the Engineers' Society of Western Pennsylvania and the Pittsburgh section of the American Society of Mechanical Engineers held a joint meeting and inspection trip on Oct. 8 in the interest of the design of river towboats. Members were invited to inspect three representative types of modern towboats which were docked in the Monongahela river. The meeting was held in the evening at the William Penn hotel. A general paper on "The Design of River Towboats" was contributed by T. R. Tarn, naval architect, Pittsburgh. Other papers, covering special phases, included one on "Boilers" by V. B. Edwards, vice president and chief engineer, Dravo Contracting Co., Pittsburgh; "Unaflow Engines as Applied to River Towboats" by Herman C. Mueller, chief engineer, Skinner Engine Co., Erie, Pa.; and "Diesel Engine Drive" by J. C. Barnaby, consulting marine engineer, Worthington Pump & Machinery Corp., New York.

Useful Hints on Cargo Handling

HE HAD served a twenty-year sentence and, when freedom came to him after all that weary time, he was an old and broken-down man. As the automobile bearing him to his destination scaled the heights of the city and a vista of loveliness revealed itself to his gaze, he bade the driver halt a moment so that he might feast his eyes upon the panorama before him. Wonderingly, the driver complied and the ex-convict, seeing the question in his companion's eyes, said



A Pacific Coast Platform Sling

with a show of deep emotion, "For twenty years I have been able to see no further than two hundred feet; now I can see for miles."*

Many men who have not been physically behind bars are nevertheless prisoners of their own limitations. Lack of perspective is often responsible for their inability to cope with the problems confronting them. To have their eyes opened, they must be released from the confines in which they have surrounded themselves and must be exposed to outside stimuli.

A business man who does not constantly look about him to see what is going on, not only in his competitor's business, but also in the whole of his community and in the economic world at large, is in effect, imprisoning himself within the narrow sphere of his own occupation. Fortunately, it lies within his own power to free himself from a life sentence.

---

*H. A. Hope.

Six obstacles to safety are:

1. Blocked aisles.
2. Overloaded trucks.
3. Carelesly piled loads on trucks.
4. Careless piling on dock.

THIS page is being devoted to short items on all matters having to do with the more efficient turn-around of ships. These items are intended to be of a helpful nature.

We will welcome for this page brief descriptions, illustrated if possible, of any better or safer way of performing any function in cargo handling. Also, any questions submitted will be answered by the editor.

5. Excess of inexperienced labor.
6. Makeshift gear and equipment.

Some things cannot be measured but the things that can be measured have been greately increased by modern management and errors in management reduced.

A coastwise line is modernizing its caster type trailers by fitting them with automatic couplers.

The Dollar line pier at San Francisco has a series of movable platforms along the side of the shed at the upper deck to facilitate handling of cargo. These platforms can be raised to prevent their causing interference with operations on the pier apron.

A New York steamship company protects the edge of wooden hatch covers with angle iron to reduce maintenance expenses. Another New York steamship line has eliminated all double hatch covers because less damage is thought to result due to throwing the heavier double covers around the deck. The lighter covers are placed on deck, rather than thrown onto the deck.

One steamship line found that the standardization of hatch covers whenever possible is a distinct advantage. The covers now fit in any hatch, 'tweendeck or weather deck and time is saved in placing them.

A stevedore supervisor reduced insurance premiums paid from $17 to $6 by thorough understanding of the relationship between accidents and insurance costs and acting on that understanding.

Mechanical equipment intelligently utilized, reduced stevedoring costs over $130,000 a year on a New York deep sea terminal.

Gasoline tractor cranes have many uses about a terminal. The Jarka corporation at Montreal was recently called upon to lend such a crane to pull an automobile out of the river. The driver of the car had steered a poor course and had put his car over the side of the wharf.

A coastwise line handled skid platforms overall without difficulty. If it is necessary to land the skids on other cargo, dunnage is placed on top of the cargo to protect it from damage by the skid legs.

Flour is loaded at Albers Mill, Oakland, Calif., by means of chutes.

The McCormick Steamship Co. uses a gasoline tractor to switch cars at its Oakland terminal. Large quantities of flour are handled at this terminal, so an expert flour cooper is employed to take care of broken bags.

New Hand Truck Developed

A NEW four wheel hand type of truck has been developed that carries twice the load of the ordinary hand truck and has a special device that permits dumping the load quickly. The platform is made up of rollers, locked when the truck is in motion but readily released when it is desired to dump the load. The same lever that unlocks the rollers folds back the forward wheel of the truck so that the truck may be tipped forward. The load can then be dropped quickly.

This new truck has the advantage of eliminating the necessity of the truckman balancing the load. All his strength can be utilized in moving the load.

Example of Good Dock Housekeeping

Fire Detecting System on Steamship Florida

BUILT for the Peninsular & Occidental Steamship Co., by the Newport News Shipbuilding & Dry Dock Co., and delivered May 30, 1931, the steamship FLORIDA was built under a special survey of the American Bureau of Shipping to class A-1 and in many respects exceeds the requirements of both the American Bureau and the United States Steamboat Inspection Service. A complete story on the S. S. FLORIDA appeared in the June, 1931, issue of MARINE REVIEW.

One of the features of this vessel is the fire detecting system with which she is equipped. To guard against a fire developing undetected in the cargo holds, crew's quarters or pasenger quarters, the ship is fitted throughout with a Garrison fire detecting system which automatically reports fire within a few minutes after it starts.

The fire detecting element of this system is a wire which is a continuous thermostat, operative throughout its entire length. Consequently ample protection is provided for hidden spaces between staterooms, etc. The fire detecting wire is of the two-conductor type and under normal conditions these two conductors are insulated from each other. When the wire becomes heated to 160 degrees Fahr. a short circuit occurs between the two conductors and a signal transmitted. In the passenger quarters and staterooms, this fire detecting wire is located on the molding and is so painted as to be hardly noticeable.

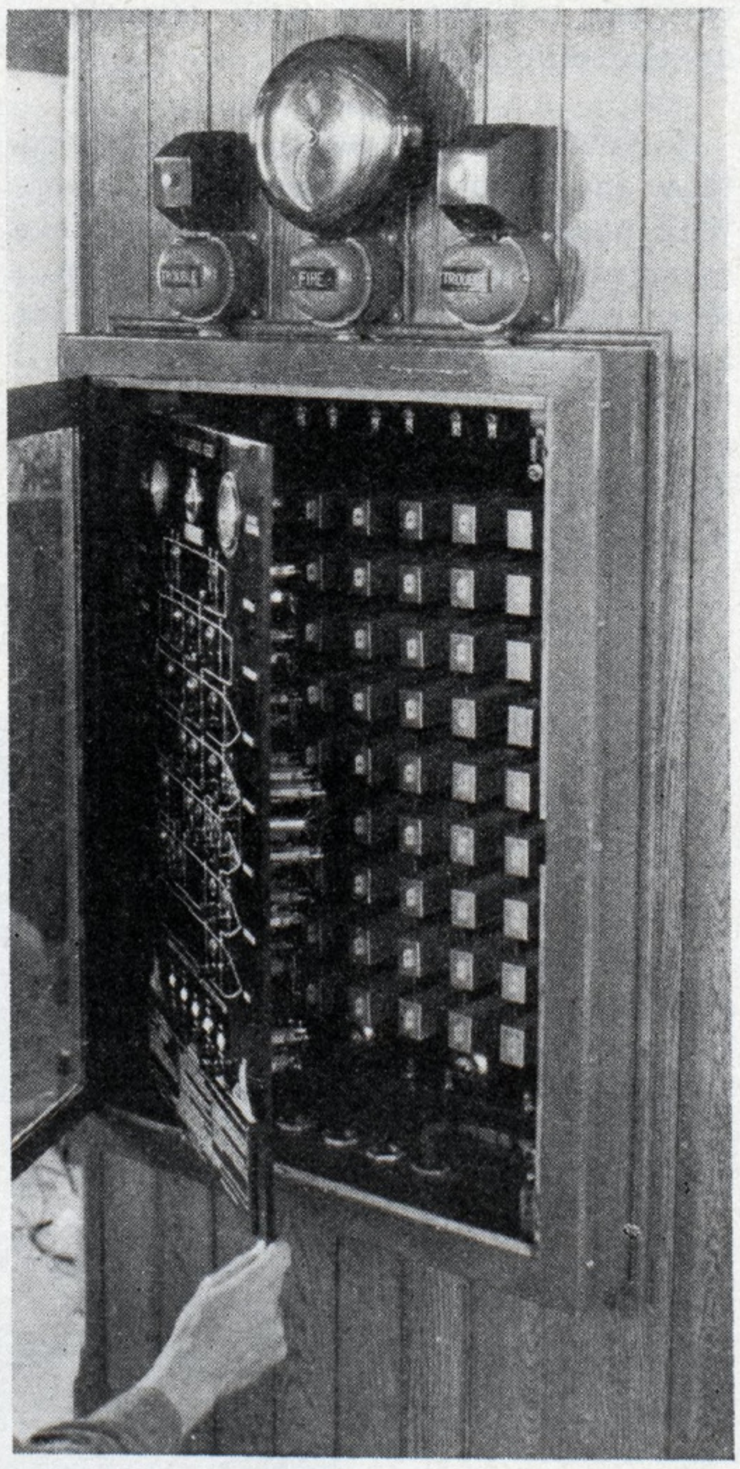
In the cargo holds the fire detecting wire is placed inside a fluted pipe, the flutes permitting the heat to reach the fire detecting wire and the walls of the pipe affording protection to the wire. The conduit or pipe terminates in pull boxes on the main deck. This arrangement permits the renewal of the wire without the necessity of entering the cargo holds.

Each circuit on the main control panel has an individual circuit cut-off button. After a fire alarm signal has passed over a circuit, all that is necessary to silence the fire gongs is to open the control cabinet and pull out the respective circuit cut-off button.

When abnormal heat develops in any zone protected, the fire detecting wire fuses and the following train of signals is instantly put into operation: (1) The fire gongs ring. One is located above the main control panel in the pilot house and the other in the engine room. (2) A large fire bulls-eye on the main control panel is lighted and a second bulls-eye in front of the wheel is also lighted. (3) The proper circuit line lamp lights and indicates the zone of abnormal heat. From this it can be seen that both visual and audible signals are given. When the signal has been flashed over the circuit, the line lamp remains lighted until service has been re-established on the circuit and the individual cut-off button has been pushed in.

Power for operating the entire system is supplied by a 24-volt battery. There is a separate six-volt battery used as a trouble battery. The fire detecting system has double battery supervision. When either the main battery or the trouble battery develops an open circuit or low voltage, a visual and audible signal is given. Cut-off buttons are provided for transferring the signals from the trouble bells mounted on top of the control cabinet to smaller bells inside the cabinet. According to the manufacturers the only way to put this automatic fire alarm out of service without giving a trouble signal is to kill both batteries at the same instant.

In order to provide a plan of each deck and thus indicate the location of the zone reporting the fire, the entire area of the main control panel was utilized to mount the line lamps and their associated circuit cut-off buttons. The relays are mounted on a separate panel securely bolted in the cabinet directly back of the annunciator panel. The front annunciator panel is hinged on the left-hand edge so that it readily swings outward to permit access to the relays. Nonferrous metal is used throughout in the construction of the control panel, thus minimizing the possibility of trouble due to corrosion or rust. The fire detecting wire is waterproof and acid fume proof and is run only in the area to be protected. The circuit is carried by means of a standard ship interconnecting cable to the pilot house.



Main control panel, fire and trouble gongs mounted in pilot house

Further Time Extension Granted in Merger

The shipping board on Oct. 23 granted a further extension of time to the Rosevelt, Dollar, Dawson and United States lines interests in which to complete details involved in the proposed merger and reorganization of the United States lines. The deadline has now been set as of Nov. 2, having been previously extended to Oct. 25 from the original deadline.

Although an announcement was made by R. Stanley Dollar, vice president of the Dollar steamship lines, on Oct. 21 in San Francisco, giving five major essentials of the program agreed upon by the various factions represented in the proposed new combine, many details are still to be worked out with the shipping board.

In the announcement made by Mr. Dollar, the five major points agreed upon were as follows: Acquisition by the Dollar-Chapman-Dawson group, backed by the interests of Herbert Fleishacker, Pacific coast financier, of half ownership in the Roosevelt Steamship Co., which is interlocked with the International Merchant Marine Co.; taking over by the United States Lines Co., a Nevada holding corporation, of the United States lines fleet; The United States Lines Co. to be owned jointly by the Dollar-Chapman-Dawson group of the Pacific coast and the Roosevelt Steamship Co. of the Atlantic coast; Intercoastal service of the Dollar steamship lines and the Panama-Pacific lines to be continued, with non-conflicting schedules to be worked out to avert overlapping; the fleet of the United States lines to be kept in Atlantic waters.

The next payment of $400,000 on the two 30,000-ton vessels under construction for the United States lines will be due the New York Shipbuilding Co., Camden, N. J. on Oct. 30. It is expected that the 25 per cent portion of this payment, $100,000, will be disbursed out of the treasury of the new company.

Equipment Used Afloat and Ashore

Chromium Nickel Alloy Finds New Uses on Shipboard—New Steel for Shipbuilding with Greater Strength—Device for Accurate Gage Readings

SOME new effects in interior decoration have been secured in the new Dollar liner PRESIDENT HOOVER by the use of chromium nickel alloy, Allegheny metal. This metal has the color of silver and is non-tarnishing.

An outstanding application is that on the four doors of the main smoking room. These doors have panels, 26½ x 60 inches, of satin-finished Allegheny metal over Armorply plywood. The panel is decorated with lattice work of polished brass, to obtain color contrast and an ornamental glass panel is set in the center.

This use of plywood as a backing for the metal is comparatively new. Its principal advantage in the present instance is that it gives light gages of the metal the flat surface and body that ordinarily would be obtained by the use of a heavy gauge, thereby making a material saving in weight. Other advantages claimed for the use of the plywood are high degrees of insulation against both heat and sound.

Table and Dresser Tops Throughout Galley of S. S. President Hoover are of Non-corroding Allegheny Metal

Another use of the alloy in this same room is in the framing of a large terra cotta panel over the fireplace. This panel, enameled in bright colors, has a frame of carved wood, enameled in the same colors as the panel. The inner and outer edges of the frame are bordered with strips of hammered Allegheny metal, with ornamental rivet heads. The beaten surface in itself is a novelty in the treatment of this new alloy. The opening of the dark marble fireplace is bordered with the same alloy in a satin finish, trim and with polished brass.

The beauty parlor and barber shop have white painted walls divided into panels by narrow strips of polished Allegheny metal, and two similar strips of the metal are run around the top of the side walls near the ceiling line.

The designers of the interior of the vessel are A. F. Marten & Co., San Francisco. The decoration work was fabricated by the Newport News Shipbuilding & Drydock Co., builders of the vessel.

Quite different from this decorative use of the alloy but based on the same qualities of resistance to salt air corrosion, is its use in the galley, where it is the material out of which table and dresser tops and similar equipment were made.

The PRESIDENT COOLIDGE, sister ship of the PRESIDENT HOOVER, which entered service from New York Oct. 5, makes similar use of the same alloy.

New Steel for Shipbuilding With Greater Strength

A NEW steel with desirable properties for ship construction has been developed by the Electro Metallurgical Co., 30 East Forty-second street, New York city. It has greater strength than carbon steel and can be used in the as-rolled condition. It can also be heated for bending and forming, without destroying the physical properties, and may be readily welded without subsequent annealing. Its slightly increased cost is more than offset by the saving that can be made in weight due to its greater strength and better physical properties.

This new steel is known as Cromansil steel from its three alloying elements, chromium, manganese and silicon. It can be readily manufactured by the open-hearth process. Steel plate and seamless tubing have already been manufactured using this alloy in full plant scale production. Many thousands of tons of this steel have been used in oil well casing. It has also been successfully used in staybolts, boiler plate and structural work.

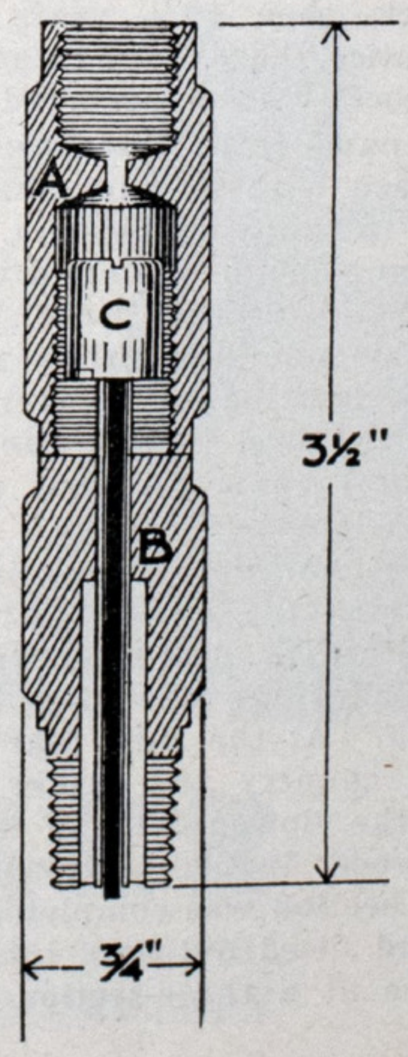
The most widely useful composition of this steel is likely to be within the following percentage range of alloy metal content: Chromium, 0.4 to 0.6 per cent; manganese, 1.1 to 1.4 per cent; and silicon, 0.7 to 0.8 per cent. The carbon content can be varied widely and the percentage should be adapted to the particular use to be made of the steel.

The combination of silicon and chromium has the effect hitherto not known of strengthening the steel without lowering the ductility. A plate one-half inch thick can be cold bent flat on itself without failure. Another unusual effect in the use of these three alloys in combination is the increased range permissible in the finishing temperature of rolling and there is therefore greater certainty of uniformity in the product.

Snubbers Insure Accurate Pressure Gage Readings

DANCING gage pointers, always a source of annoyance to engineers, can be steadied through the application of snubbers, affording accurate readings. The accompanying drawing illustrates a presure gage snubber developed by the Ray Pressure Snubber Co. and distributed by the Leslie Co., Lyndhurst, N. J. The traveling clearing pin is contained within the part B, the head of the pin being slotted on the top and bottom to form ports for the liquid to pass through. The liquid travels up through the tubular orifice, shown in B, and out through the ports on part C, filling the upper body A and passing through the port in A into the neck of the gage.

The term "traveling clearing pin" is used because on each pulsation of the pump or piston, the clearing pin C rises and falls within the tubular orifice shown in B. This absorbs all pulsation from the pump and at the same time cleans the orifice in body B because the clearing pin projects below the mouth of the orifice. Any sediment that is kicked out of the orifice accumulates around the orifice in the recesses shown on each side of it. The snubbing effect is produced by the restriction offered by the traveling clearing pin *C* within the tubular orifice and the fact that the pin rises and falls on each pulsation of the pump. The snubber can be used on air, water, steam, oil, ammonia, paint and all other fluids.

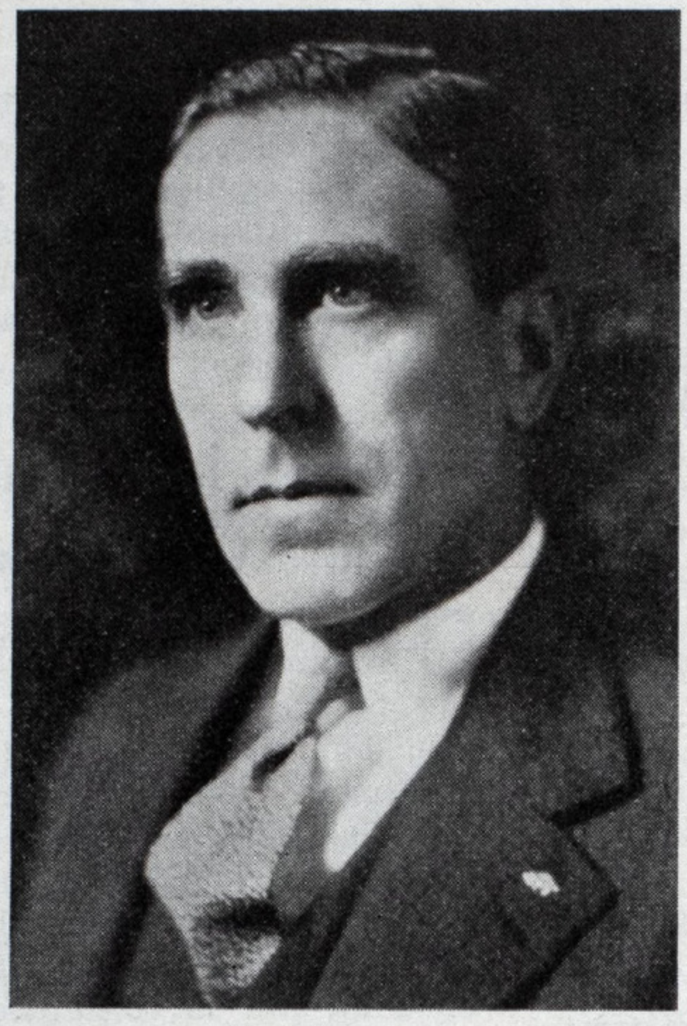


Cross Section of Ray Pressure Snubber

Personal Sketches of Marine Men

Charles S. Hallock, Vice President, United Dry Docks Inc.

By E. C. Kreutzberg



HIS experience in shipbuilding and ship repairs covers a period of over three decades and every possible type of vessel.

BEGINNING at 14 his activities span the growth of a small organization to one of the giants in ship repairs and drydocking.

IN HIS present duties in charge of sales and estimates he can draw on a deep fundamental knowledge of the business of ship repairing.

THE story of Charles S. Hallock, vice president of United Dry Dock Inc., New York, begins with that of his father. Both famous dockmasters and ship repairmen, Charles Hallock followed close in the path his father blazed. John H. Hallock, left his home at Islip, Long Island, in 1870, to go to work at the old Burtis shipyard in Brooklyn, where he learned the ship repair business and won a reputation for his skill and judgment in docking the big ships of the day. In 1900 he became connected with the newly-organized Morse Iron Works, which he was destined to see grow to great size before his death in 1926.

Charles S. Hallock, born at Islip, in 1883, started following in his father's foot steps at the age of 14. In 1897 he got a job as an apprentice in the machine shop of McCaldin Bros., located in the old warehouse at the end of the pier where the elder Hallock presided over the docks of the Brooklyn Wharf & Dry Dock Co. In 1899 the Morse firm built its first machine shop and the younger Hallock, then 15½ years old, became a machinist's apprentice there. An interesting experience in Charles S. Hallock's career occurred at that time.

An engineer name Graef, then working around Brooklyn, was obsessed with an idea that a gasoline engine could be made to run a motor boat. He hired a corner of the old Morse machine shop and the services of young Hallock. The result was the Graef motor. A wierd contrivance was this one-lung prime mover, with sketchy make-and-break ignition installed inside of a box; but it was one of the first, if not the very first, gasoline engine ever put in a motor boat, a 5-horsepower job driving an open launch.

In the meantime, the Morse firm had bought the property on which the present Fifty-sixth street plant is located; Hallock Sr. had been employed to complete the construction of the new dry dock there, with his son on his staff. At the time that section of Brooklyn still was open country and father and son walked to work through the plowed fields of farms. The new dock was built of wood, in five sections, at Verplanck, New York; as each section was completed it was towed down the Hudson and fitted out and, in 1901, it was thrown open to service at a three-section dock, to which two additional sections later were added.

In 1906, the younger Hallock was named assistant dock master under his father and, in that capacity, had much to do with the design and construction of No. 2 dry dock at the foot of Fifty-sixth street. This dock, which was placed in operation in 1915 after five years spent in designing and constructing it, is in six sections, is 685 feet long and has capacity for accommodatng a 27,000-ton ship. It is the largest floating dry dock in America.

In 1914 Charles S. Hallock became inspector of repairs for the Morse Dry Dock & Repair Co. Next he was appointed assistant superintendent of the Fifty-sixth street plant. In 1917 he was named superintendent and in 1921 manager of the Morse properties. When the Morse company, in 1929, became a principal factor in the consolidation now known as United Dry Docks Inc. he was made manager of plants, of which at first there were seven, all located in New York harbor. These included the Morse, Staten Island, Fletcher, Crane, Shewan, Alderton and New York Harbor Dry Dock plants, as well as the Mill Creek Yacht Basin. The welding together of these various factors, with their deep rooted affiliations and diversity of method and equipment, was a task that called for executive judgment of the soundest type. In 1930, he was made vice president in charge of sales.

Throughout his career, Mr. Hallock has been a close student of marine, mechanical and electrical engineering as applied to shipbuilding and ship repairing. While pursuing his studies in the electrical field, he became especially interested in radio and about 1900 with his own equpment, he heard the first broadcasting of the human voice, coming from the experimental station of Dr. Lee DeForest, in New York.

He is descended from an old Colonial family. His earliest forbear on American soil was John Henry Hallock who came from England and in 1665 settled on the north shore of Long Island. Mr. Hallock's office is at the 11 Broadway headquarters of the company. He is a member of the Society of Naval Architects and Marine Engineers, is interested in Masonic activities and is a member of the Marine Square club and of the Norwegian club of New York.

Diesel Drive and Auxiliaries in Freighter Lake Osweya

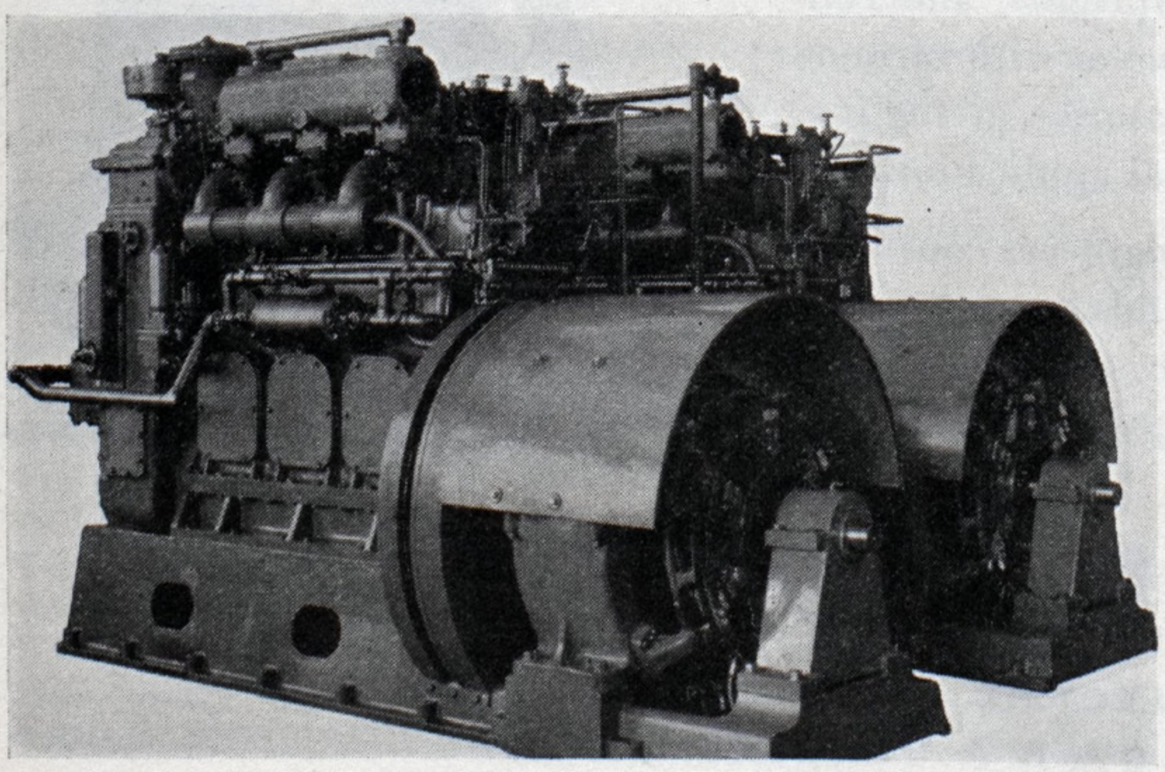
THE LAKE OSWEYA was built on the Great Lakes during the war as one of the great merchant fleet turned out on these inland waters for ocean use. Having outlived her usefulness, she was one of the 199 vessels bought by the Ford Motor Co. from the shipping board for scrapping. She did not go into the scrap heap, however. By arrangement with the board she was selected by the Ford company for conversion into a useful unit of transportation.

In her original state she had a triple expansion, reciprocating steam engine and watertube boilers, burning coal. Work of converting her into a modern motorship was done by the Great Lakes Engineering Works, River Rouge, Mich. Her old machinery was removed and a 1200 shaft horsepower Sun-Doxford opposed piston two-cycle, solid injection, diesel engine was installed. Her speed was increased from 9.5 knots to 10.5. Her fuel consumption was reduced from a daily consumption of over 26 tons to under 7 tons of diesel engine fuel oil per day. The conversion of this vessel throughout is a splendid example of the progress made in marine engineering since the time of her building.

For auxiliary power there are three 3-cylinder, 4-cycle airless injection, trunk piston, 150 brake horsepower Cooper-Bessemer diesel engines, each direct connected to an 85 kilowatts, 220 volts, direct current Crocker Wheeler generator. These generators furnish electric power for operating all auxiliaries at sea and the cargo winches in port. Two of the generating sets are located on the port side of the engine room, one ahead of the other and parallel to the main engine, while the third set is similarly located on the starboard side. The overall dimensions including the generator are: Length, 12 feet 11 inches; height, 9 feet 4⅜ inches; width, 4 feet 5 inches (engine) and 5 feet 6 inches (generator). The weight of one engine and generator combined is 20,700 pounds. The engines operate at 350 revolutions per minute. The fuel consumption is 0.45 pounds per brake horsepower per hour. The accompanying illustration indicates the compactness and simplicity of these generating sets.

The LAKE OSWEYA has a gross tonnage of 2398 and a deadweight capacity of about 3400 tons. Her dimensions are: Length overall, 261 feet; beam, 43 feet 6 inches, and draft, 24 feet 2½ inches. Her maiden voyage was from the Ford plant in Detroit, loaded with automobile products for the Ford plant in Chester, Pa. From the latter port she made a voyage in loaded condition to the West coast at an average speed of 10.5 knots. From Olympia, Wash., she returned to Edgewater, N. J., to load at the Ford plant there for Europe.

It will pay to watch the performance of this vessel. Nothing has been stinted to make her in every respect as efficient as possible and her cost of operation will be correspondingly low.



Three generating sets for auxiliary power are fitted on the Lake Oswego. The 85 K. W. generators are direct connected to 150-horsepower Cooper-Bessemer diesel engines operating at 350 revolutions per minute

Request No Appropriation

Co-operating with the administration's plan for the utmost economy in governmental expenditures and a minimum of appropriation demands upon the treasury, Chairman O'Connor on Oct. 14 received the shipping board's approval of a proposition to request no appropriation for operations under shipping fund for next fiscal year ending June 30, 1933.

It is fully anticipated that Fleet corporation surplus will furnish the necessary funds with which to carry on not only for 1932, during which year indications are that previous loss estimates will be considerably exceeded, but also for 1933, when it is anticipated that several lines will have been sold to private American owners. These are the American Hampton Roads line, American Republics line, Dixie Mediterranean line, and Oriole lines, in addition to the American Diamond lines and Mobile Oceanic line which have been disposed of and are in process of delivery.

Twenty-two candidates, 13 from the deck department and nine from the engineering department, were recently graduated from the New York State Merchant Marine academy at appropriate exercises held at the New York Maritime Exchange, 80 Broad street, New York. Joseph Tillotson Drake Jr., first honor graduate of the deck department, was presented with a sextant, and Edward Robert Golub, first honor graduate in the engineering department, received a set of drawing instruments.

Will Remove Propellers

While the new EMPRESS OF BRITAIN is in dry dock at Southampton in preparation for her world cruise, leaving New York, Dec. 3, she will have her two outboard propellers removed and the tail shafts replaced by streamlined torpedo heads. The change is made with a view to reducing fuel costs and to reduce the engine room staff for this cruise only. The vessel during her trial runs attained a speed of 25.52 knots with all four propellers in operation and 22.6 knots with only the inboard propellers working and the others dragging.

Shutting down of the two engines will mean a reduction of 21,000 horsepower and a material saving in fuel.

James A. Farrell Jr., head of the American South African line, on Oct. 15 was elected a member of the board of trustees of the American Merchant Marine Library association.

J. W. Barnett of Marion, O., was appointed on Sept. 29 by the shipping board to succeed J. L. Ackerson as director of the board's bureau of construction.

Named Executive of Line

J. Caldwell Jenkins, former vice president of the Merchant Fleet Corp., recently joined the Black Diamond Steamship Corp., general agent of the American Diamond lines, as vice president and director. Mr. Jenkins will make his headquarters temporarily in Washington, pending the transfer of the ships of the line to the Black Diamond Corp., which has purchased the line from the shipping board.

Up and Down the Great Lakes

Lakes-to-Gulf—Bulk Shipments Much Less—River and Harbor Costs Less—Lake Levels—New Canal Barge—Rapid Growth of Port

WORK on the final link of the Lakes-to-Gulf water route, which constitutes the 50-mile stretch on the Illinois river between Lockport and Starved Rock, Ill., is rapidly nearing completion. Little doubt is expressed but that the Lockport-Starved Rock link can be completed by early in 1933. Total cost for this section is $27,500,000.

A new waterway terminal at Peoria, Ill., has been handling traffic from the southern ports only, but has established a surprising record of business since it opened recently. Railroad officials, who at one time strenuously opposed the establishment of the waterway terminal, readily admit that it has greatly stimulated their own business. Numerous shipments of sugar, canned goods and other commodities have been made from southerly ports by water and then transferred to rail for shipment north, west and east.

Seasonal Shipments Less

Movement of iron ore for the season to Oct. 1 showed a large decrease over last year. Receipts for this year amounted to 12,270,487 tons, whereas for last year to Oct. 1, 26,329,960 tons were received. For the month of September, vessels delivered 2,873,135 tons compared with September, 1930, when 4,721,474 tons were handled. During the season to Oct. 1, a total of 9,426,591 tons were forwarded to interior furnaces; for last year the movement to interior furnaces was 19,406,840 tons. Oct. 1 Lake Erie docks had on hand 5,973,654 tons, as compared with 6,043,654 tons at the same time in 1930. Conneaut leads all ports in receipts of iron ore with 3,180,714 tons, with Cleveland second, receiving 2,861,171 tons.

Shipments of coal for the season to Oct. 5 were 23,303,575 tons, as compared with 29,529,855 tons for the same period in 1930. In 1929, a total of 29,653,850 tons were shipped to Oct. 5.

River and Harbor Costs

Reduced costs of rivers and harbors construction have resulted in a slash by army engineers of $7,000,000 in their 1933 rivers and harbors estimates for Great Lakes and other territory.

A survey along the Mississippi river has shown that levee work from Cairo, Ill., to New Orleans, La., is being done for two-thirds of the estimated cost of such work in 1928. Maj. Gen. Lytle Brown, chief of army engineers, on the other hand, has asked for $35,000,000 for flood control work, the same sum as was granted for 1932. Rivers and harbors appropriations for 1932 totaled $82,500,000.

Chief among the projects which will be extended under the 1933 requests are the upper Mississippi 9-foot channel project, the Missouri river channel from the mouth to Sioux City, Iowa, and the Illinois waterway, which it is predicted will be completed during 1933. In anticipation of an agreement with Canada for the proposed St. Lawrence waterway, the engineers plan to proceed with the deepening from 21 to 27 feet of the connecting channels for the Great Lakes.

September Lake Levels

The United States Lake survey reports the monthly mean stages of the Great Lakes for the month of September as follows:

Lakes	Feet above mean sea level
Superior	602.38
Michigan-Huron	578.63
St. Clair	573.92
Erie	571.23
Ontario	244.59

Lake Superior was the same level as in August and 0.36-foot lower than the September stage of a year ago.

Lakes Michigan-Huron were 0.30-foot lower than in August and 2.07 feet lower than the September stage of a year ago.

Lake Erie was 0.29-foot lower than in August and 1.45 feet lower than the September stage of a year ago.

Lake Ontario was 0.30-foot lower than in August and 2.26 feet lower than the September stage of a year ago.

Inspect Canal Barge

Shippers on Lake Michigan recently inspected the barge-steamer, CHESTER, owned by the Ford Motor Co., which because of the collapsability of stacks and masts, and due to the ability of this vessel to lower its pilot house, is regarded as an advantageous type for navigating the Chicago river, where numerous lift bridges are located. Mayor A. J. Cermak and a number of other muncipal and harbor officials made a trip on the CHESTER along the north branch of the Chicago river, through the Chicago harbor area on Sept. 28, after the craft had docked at Chicago with a cargo. A wider adaptation of this type of vessel is being advocated for Chicago harbor shipping, so that it will not be necessary for bridges to be raised as often in the downtown business area of Chicago.

The steamer, CHARLES H. BRADLEY, operated by O. W. Blodgett, Bay City, Mich., as a lumber vessel, was seriously damaged by fire on Oct. 9, after going aground near the entrance to the Portage river at Stoughton, Mich.

Leads Great Lakes Ports

How Milwaukee is growing as a Great Lakes port is shown by a study that has just been completed there by the board of engineers for rivers and harbors, in co-operation with the bureau of operations of the United States shipping board.

While Milwaukee was eleventh among Great Lakes ports in 1930 in terms of trade tonnage, this port ranked first from the standpoint of domestic commerce handled. "Due chiefly to the great volume of car-ferry traffic in valuable goods, Milwaukee in 1930 ranked first in lake ports from the standpoint of domestic commerce handled, although in terms of tonnage its total trade was exceeded by ten other lake ports," the survey states.

"The Milwaukee port is prominent in the grain trade, being one of a group of four Great Lakes ports which ship practically all of the enormous volume of grain flowing eastward over the lakes.

"Its position in this trade is due to the fact that its natural tributary area on the west, which includes the principal grain producing states, is one of the most important grain growing territories in the world."

Capt. George W. Pearson, oldest master in active service in the fleet of Canada Steamship lines, died at his home in Owen Sound, Oct. 12 in his seventieth year.

His career as a lake boat master was confined to the upper lakes, and he was one of the best known skippers in the Fort William and Georgian Bay trade. For 11 successive seasons he has captained the S. S. COLLINGWOOD.

He is survived by his widow, two sons, Frank A. of Fort Frances and John P. of Port McNicoll, and one daugter, Kathleen. The funeral was held Thursday, Oct. 15.

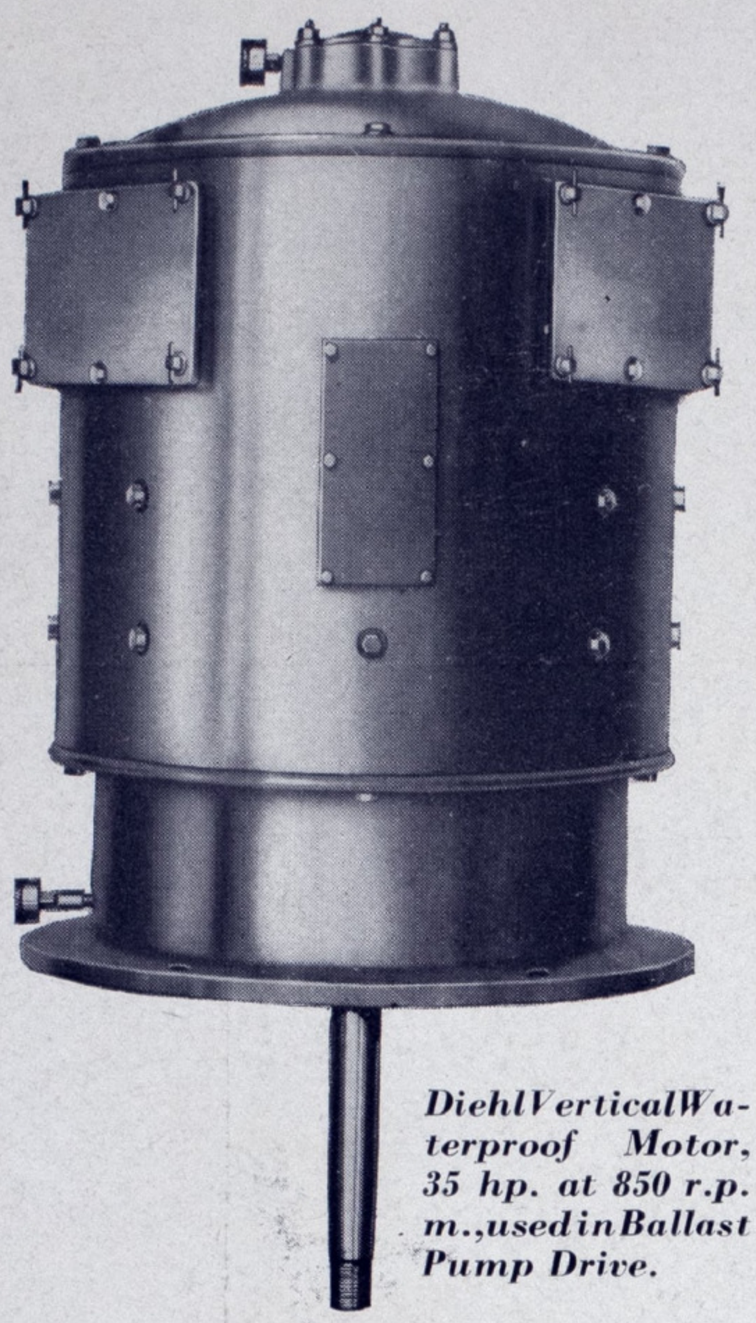
Marine Review

Reg. U.S. Pat. Off.

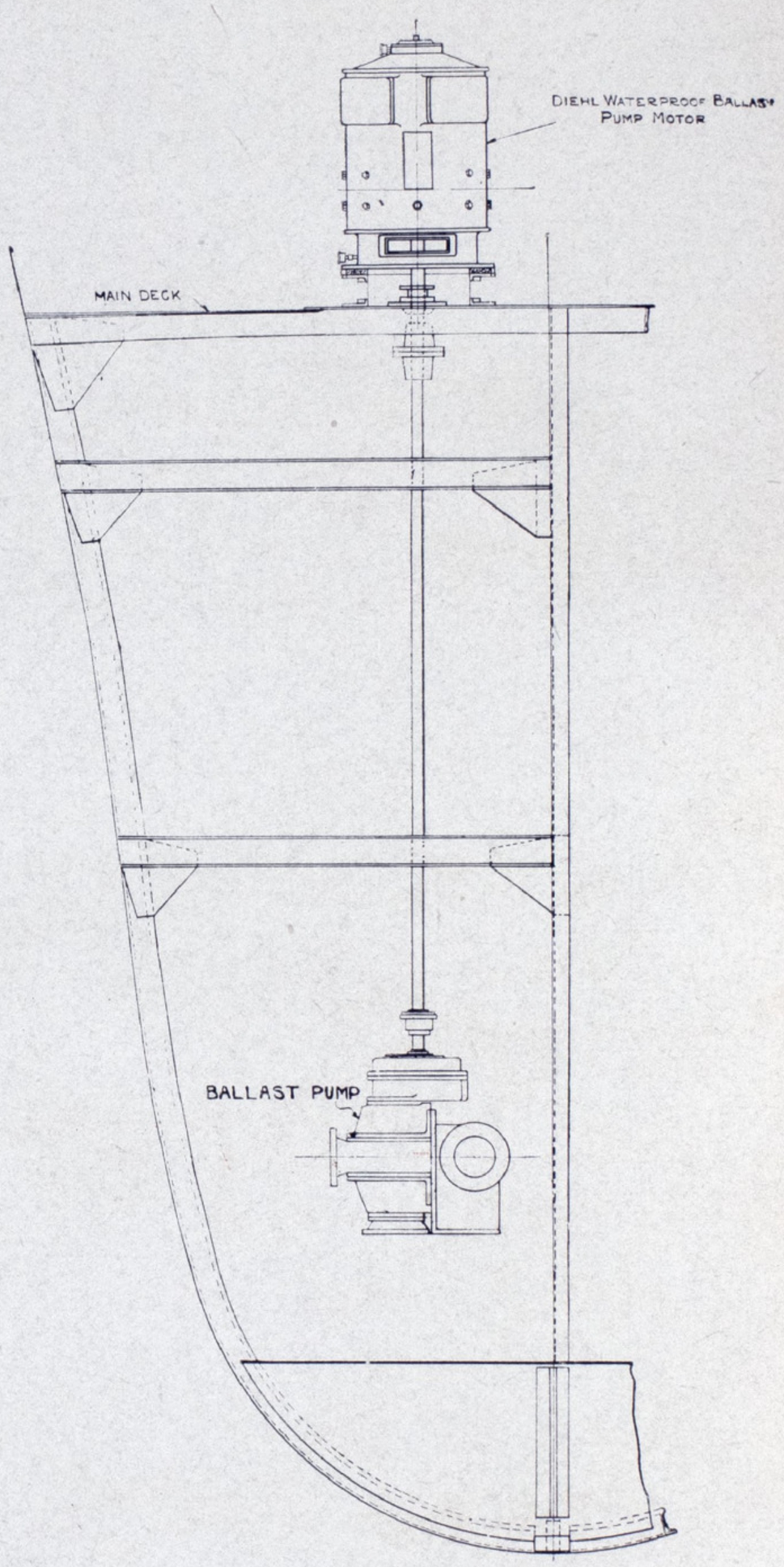
The National Publication Covering the Business of Transportation by Water

November, 1931

Out in the Open and Above Board



DiehlVerticalWaterproof Motor, 35 hp. at 850 r.p.m.,usedinBallast Pump Drive.



MOUNTED on the main deck of the Standard Transportation Company's new tank barge now building at the Sparrows Point plant of the Bethlehem Shipbuilding Corporation, this Diehl Vertical Ballast Pump Motor effects important economies in space with a high degree of operation efficiency and dependability.

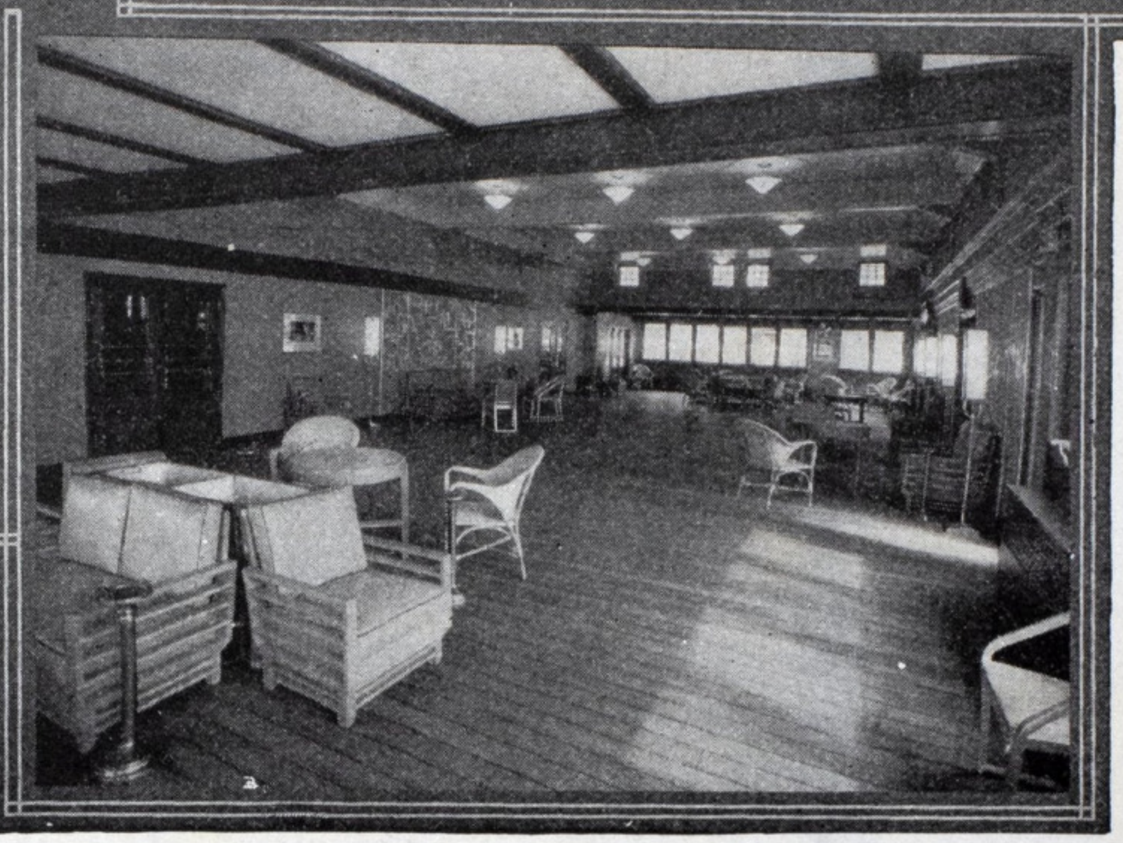
The motor has Timken roller bearings, marine insulation, non-corrodible fittings and waterproof enclosure, affording complete protection against deck wash and the destructive forces of the elements.

Diehl marine type motors and fans have earned an enviable reputation with ship owners and operators for faithful and efficient performance under all service conditions. Keep this in mind on your next installation.

DIEHL MANUFACTURING COMPANY
Electrical Division of
THE SINGER MANUFACTURING COMPANY
Atlanta Boston Chicago **Elizabethport, New Jersey** New York Philadelphia

DIEHL

Vol. 61, No. 11, Nov.. 1931, issue of MARINE REVIEW, published monthly at Cleveland, O. Entered as second class matter at the post office Cleveland, Ohio, under the act of March 3, 1879. Subscription price $3.00 a year in U. S.; Canada, $4.00; Great Britain, £1; single copies, 35c



New Turbo-Electric Express Steamers Designed and Built for the Dollar Line by Newport News S. & D. D. Co.

KEARFOTT WINDOWS
on the
PRESIDENT HOOVER
and the
PRESIDENT COOLIDGE

Shelter windows of the sliding type enclose the promenade deck both fore and aft. Thwartships windows forward are fitted with transoms. All windows are supplied with bronze raising and lowering mechanism, and are fitted with ¾-inch sashless plate glass.

Deckhouse windows in the de luxe suite, special class smoking room and soda fountain room are of watertight design. These windows have vertically sliding sashless lights, with provision for water-tightness by hand tightening dogs.

Kearfott-Kawneer Casement Windows are installed in the public rooms and stair lobbies. These windows are of various sizes and proportion to meet architectural requirements.

KEARFOTT ENGINEERING COMPANY, INC.

117 LIBERTY STREET, NEW YORK

Drifting in the dark...

IN the light of day a drifting derelict holds little menace. You can *see* it. But who hasn't quailed at the thought of a waterlogged hulk dead ahead in the dark?

Low-grade lubricants aren't as dangerous as derelicts. They can't wreck a ship, but they can eventually ruin an engine. And, like the drifting derelict, the running lights are missing. There is no warning of trouble ahead.

Gargoyle Marine Oils are no cure-all. Friction cannot be wholly eliminated. But 65 years of experience in scientific lubrication have produced the best engine protection you can buy. That's what you get when you use Gargoyle Marine Oils.

Performance records in the bulk of the world's tonnage have proved the practical economy of Gargoyle Marine Oils in power saved, reduced fuel and oil consumption, lower repair bills and longer engine life.

You will find these high-quality lubricants at more than 300 of the world's leading ports. A capable Vacuum Oil Company representative in each port is at your service. A talk with one of these men may result in new ideas on the question of cost-cutting lubrication.

In the meantime, we will be glad to send you either of these helpful books, without obligation: "*Steamships with Reciprocating Engines*," or "*Marine Lubrication—Motorships.*" Address: Vacuum Oil Company, Marine Sales Dept. D-11, 61 Broadway, New York.

GARGOYLE

Marine Oils

A grade for each type of service

VACUUM OIL COMPANY

4 new tugs...*ultra-*

The Erie Limited—New York-Buffalo-Chicago

All four equipped with this

soft rubber

that puts an

"ROCHESTER," *one of four 108' long, electrically driven tugs built by Pusey & Jones Corp., Wilmington. All have Ingersoll-Rand Diesel engines; General Electric generators and motors. Propeller shafts carried in Goodrich rubber bearings.*

INSTALL it in one vessel. See how it works. Then proceed to additional installations. That's the approved method, of course. But the Erie had no need for pioneering. In spite of the fact that they'd had no experience themselves with this soft rubber bearing, they specified it for *all four* of their huge new electrically driven tugs.

Two facts influenced their choice . . . (1) the soft rubber bearing's radically different, and obviously sound design and construction (2) its remarkable service record in harbor craft operating under conditions similar to those faced by the Erie's new tug.

Picture a bearing of soft rubber, a veritable

Goodrich *Cutless*

modern as New York's Skyline

Above: *The* "CLEVELAND."

Lower left: *the "Rochester," which, with their sister ships, the "Scranton" and "Olean," are equipped with Goodrich rubber bearings.*

bearing

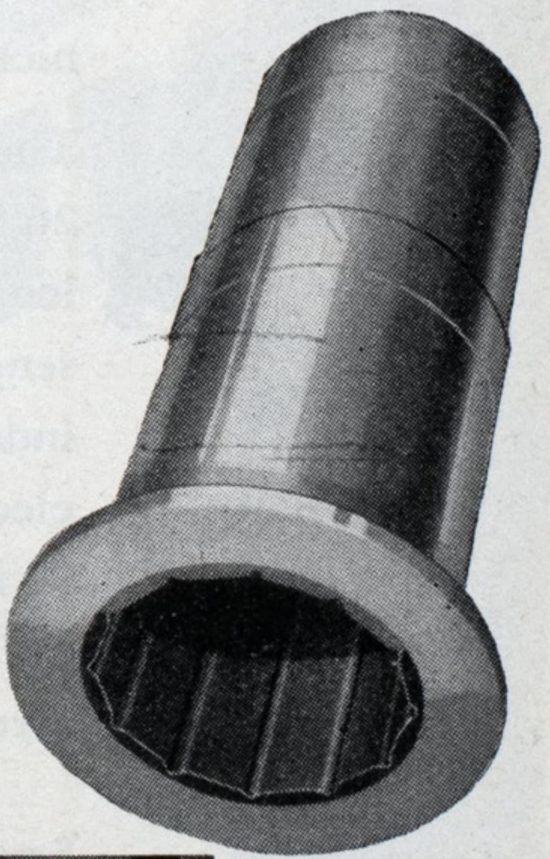
end to frequent renewals . .

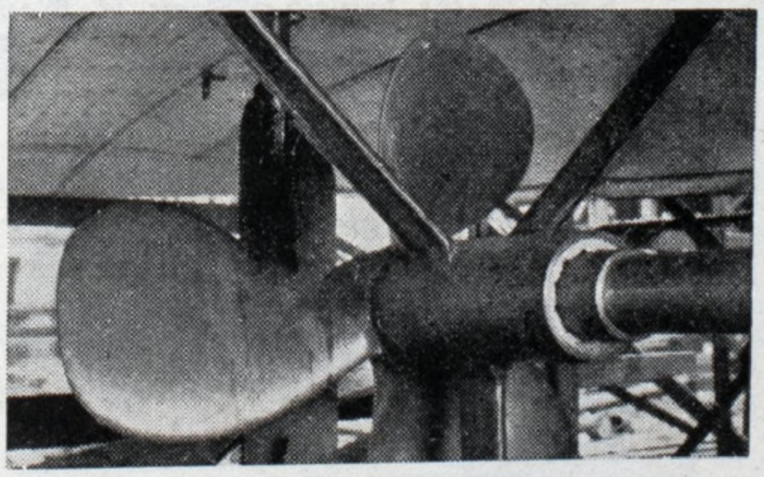
cushion for the driving shaft. You know that the coefficient of friction must be very low, for you have seen rubber tires slide on wet street-car tracks. You know that wear is negligible, for you have seen rubber tires run for thousands of miles while steel skid chains last but a few hundred.

And if you will examine the grooves that line the soft rubber bearing, you will readily understand why it so effectively protects both its own surface, and that of the driving shaft, from the abrasive action of sand and grit. Sandy particles entering between shaft and bearing are accepted by the soft rubber, rolled into the adjacent grooves, and washed right out by the lubricating water stream. The bearing remains uncut, the shaft unscored.

Facts and figures on specific installations prove that this bearing *outlasts all others,* often indeed by as much as ten to one.

For Catalog 1131-C describing this soft rubber bearing in general terms . . . for engineering coöperation in the solution of specific problems . . . address The B. F. Goodrich Rubber Company, (Est. 1870), Akron, Ohio.





Goodrich rubber bearings are available, for both stern and strut, in sizes suitable for every craft.

Above: **Metal shell and rubber lining of a Goodrich bearing. Note grooves through which grit is ejected by the lubricating water stream.**

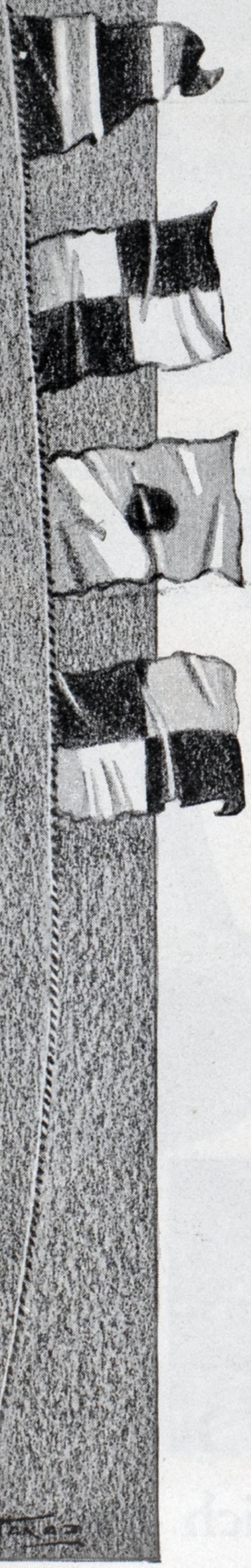
Bearings

Another B. F. Goodrich *Product*

Another

ELECTRIC LINER MERCHANT FLEET

The S.S. President Coolidge

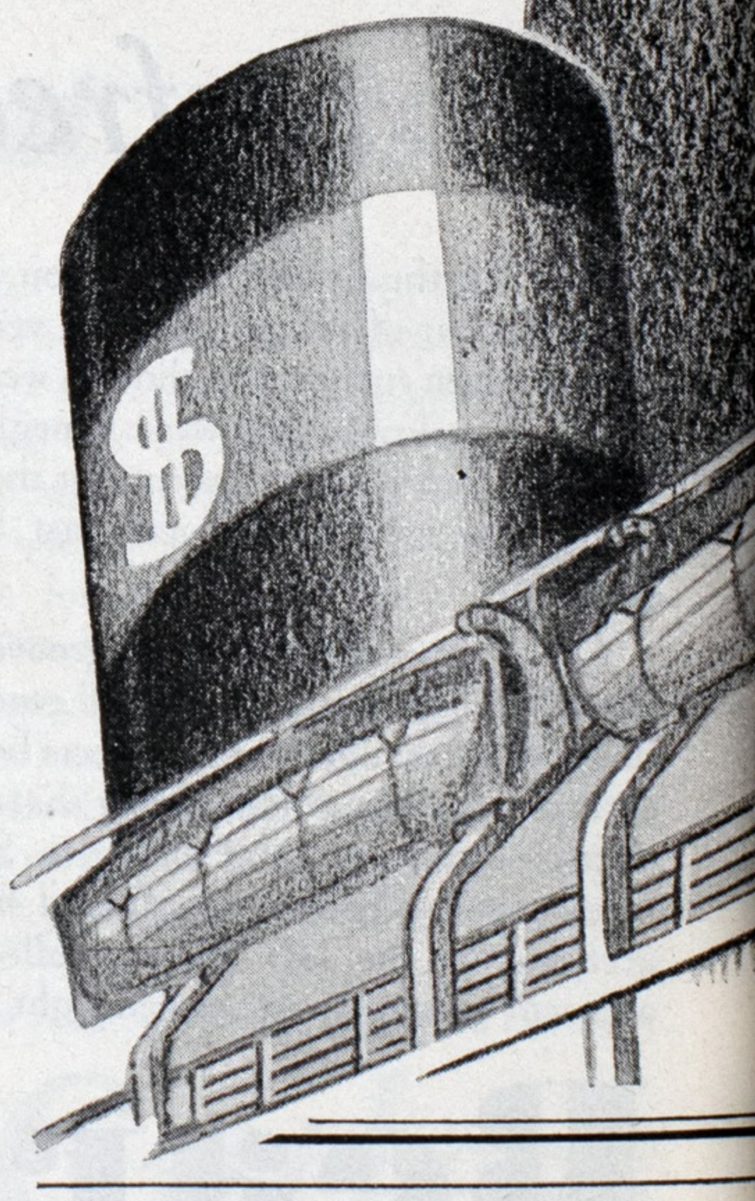


ON October 15th, the palatial twin flagship of the famous Dollar Line fleet—the S. S. President Coolidge—sails from New York on her maiden voyage through the Panama Canal to California, Hawaii, and the Orient.

Equipped with Westinghouse turbine electric drive, this latest addition of the Dollar Line swiftly and quietly logs knot after knot. And as modern as her drive are her deck and underdeck auxiliaries which are powered by Westinghouse motors, assuring economical and dependable service with the quietness of operation demanded today of all modern passenger ships.

Westinghouse marine type fans and specially designed heaters for staterooms and living spaces add to the comfort and convenience of the passengers and crew.

The selection of turbine electric drive for this 26,500 shp. round-the-world liner, over 600 feet in length, with accommodations for nearly 1000 passengers, is a tribute to the confidence of the shipping industry in electric drive. Westinghouse turbine electric drive, in addition to the President Coolidge, is installed in many classes of vessels from the greatest dreadnaughts to towboats on our western rivers.



Some of the principal items of Westinghouse equipment installed on the S. S. President Coolidge:

2—10,200 kw. main turbine generators

2—13,250 shp. propulsion motors

1—Propulsion control

2—Propeller-type blowers for main motors

4—500 kw. auxiliary turbine generator sets

39—Motors and control for pumps, compressors and other underdeck auxiliaries

24—Cargo winch motors and control of 25 and 35 hp.

39—Hull ventilation motors and control

2—75 hp. steering gear motors and control

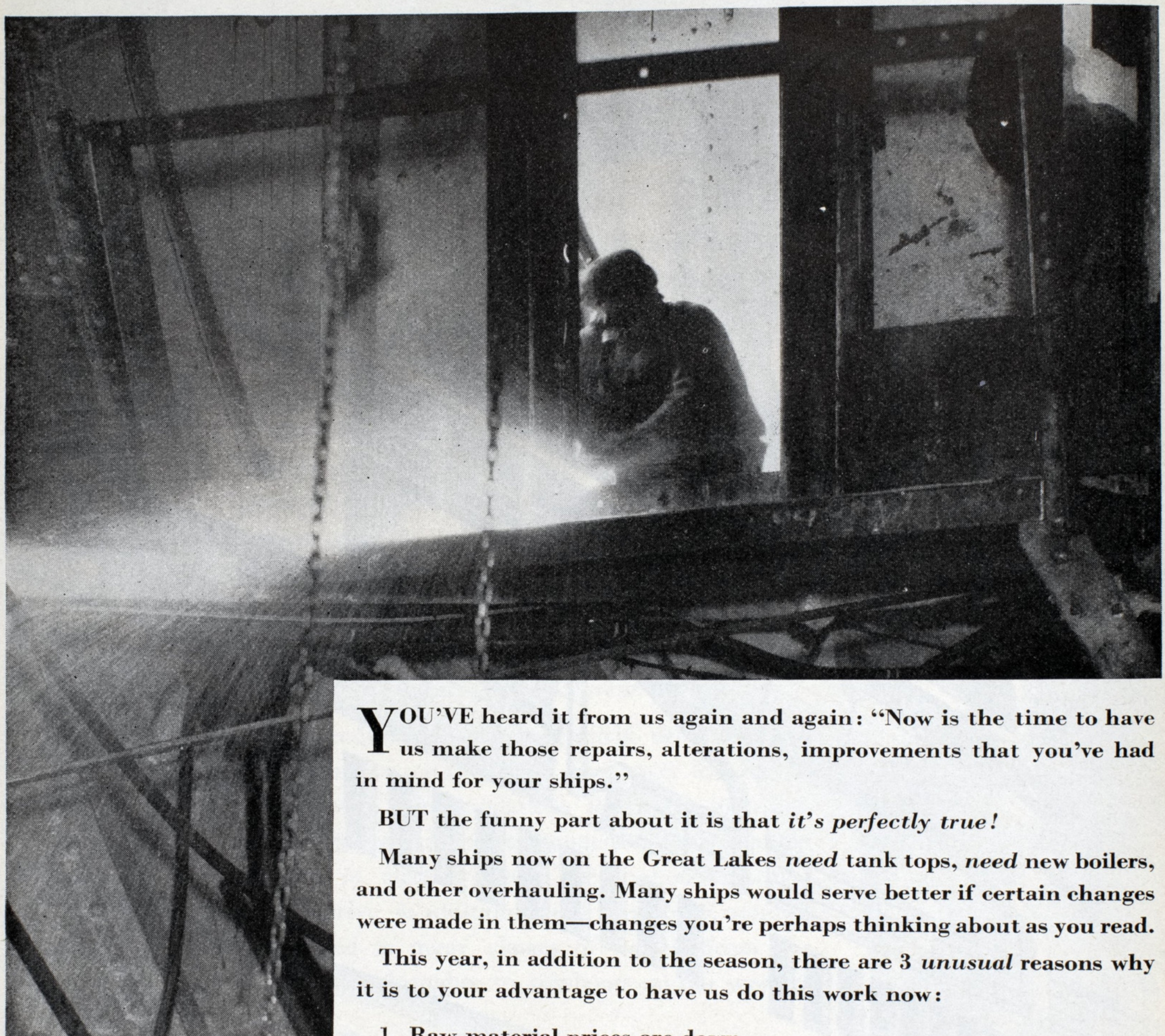
8—Life boat winch motors and control

9—Cargo cooling fan motors and control

282—Electric heaters for staterooms and bathrooms

365—Marine type stateroom fans

EVERY FALL, *the same old story . . .*
but this time an unusual *opportunity*



YOU'VE heard it from us again and again: "Now is the time to have us make those repairs, alterations, improvements that you've had in mind for your ships."

BUT the funny part about it is that *it's perfectly true!*

Many ships now on the Great Lakes *need* tank tops, *need* new boilers, and other overhauling. Many ships would serve better if certain changes were made in them—changes you're perhaps thinking about as you read.

This year, in addition to the season, there are 3 *unusual* reasons why it is to your advantage to have us do this work now:

1. Raw material prices are down.
2. Labor costs are lower—and labor is more efficient.
3. Now you can get a better job for less money—and get it quicker.

May we have your instructions?

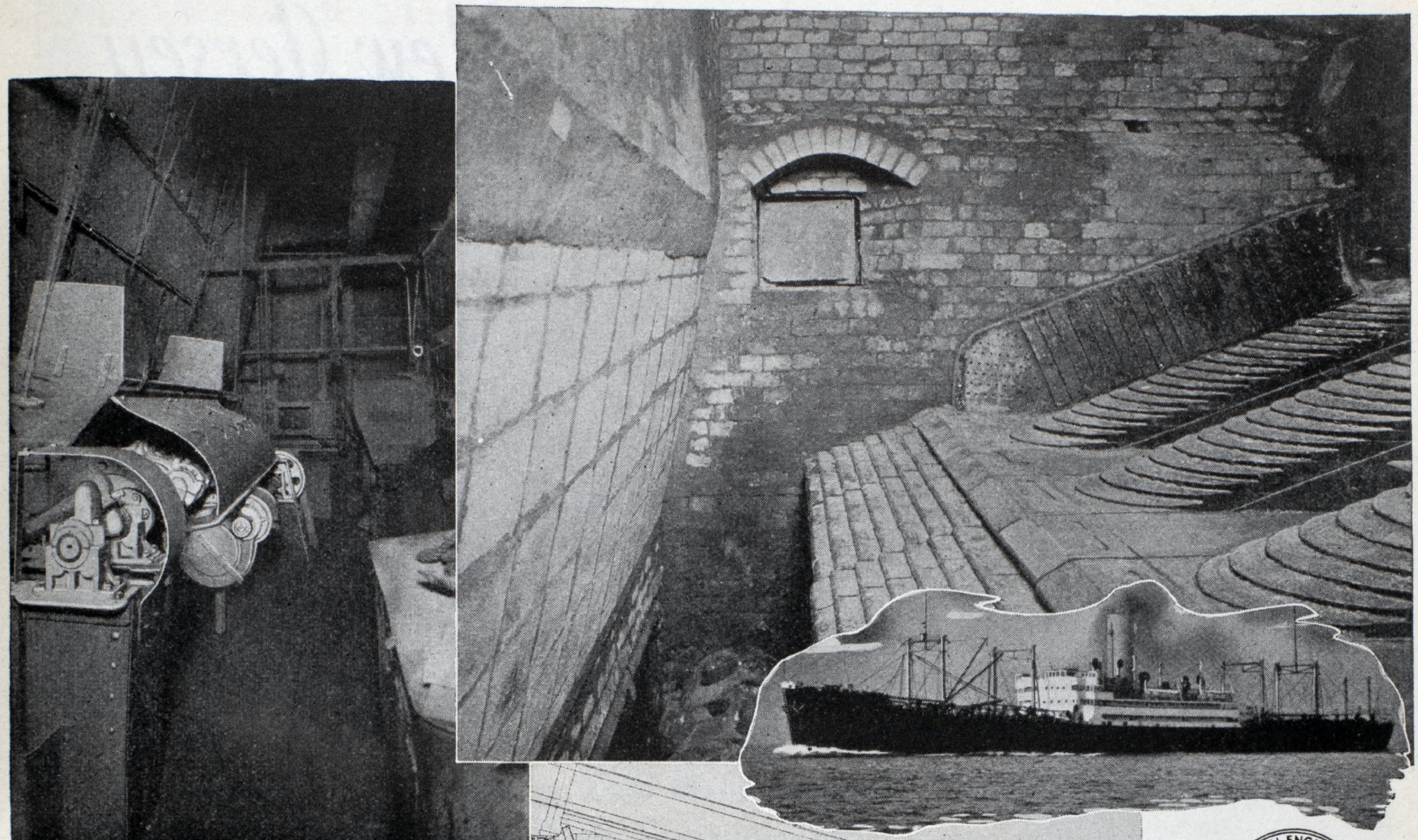
The AMERICAN SHIP BUILDING CO.

Main Office: Foot of West 54th Street, Cleveland, Ohio

CLEVELAND	LORAIN	BUFFALO	SOUTH CHICAGO	SUPERIOR
American Ship Building Co.	*American Ship Building Co.*	*Buffalo Dry Dock Company*	*Chicago Ship Building Co.*	*Superior Shipbuilding Co.*

TAYLOR STOKER

For Marine Boilers

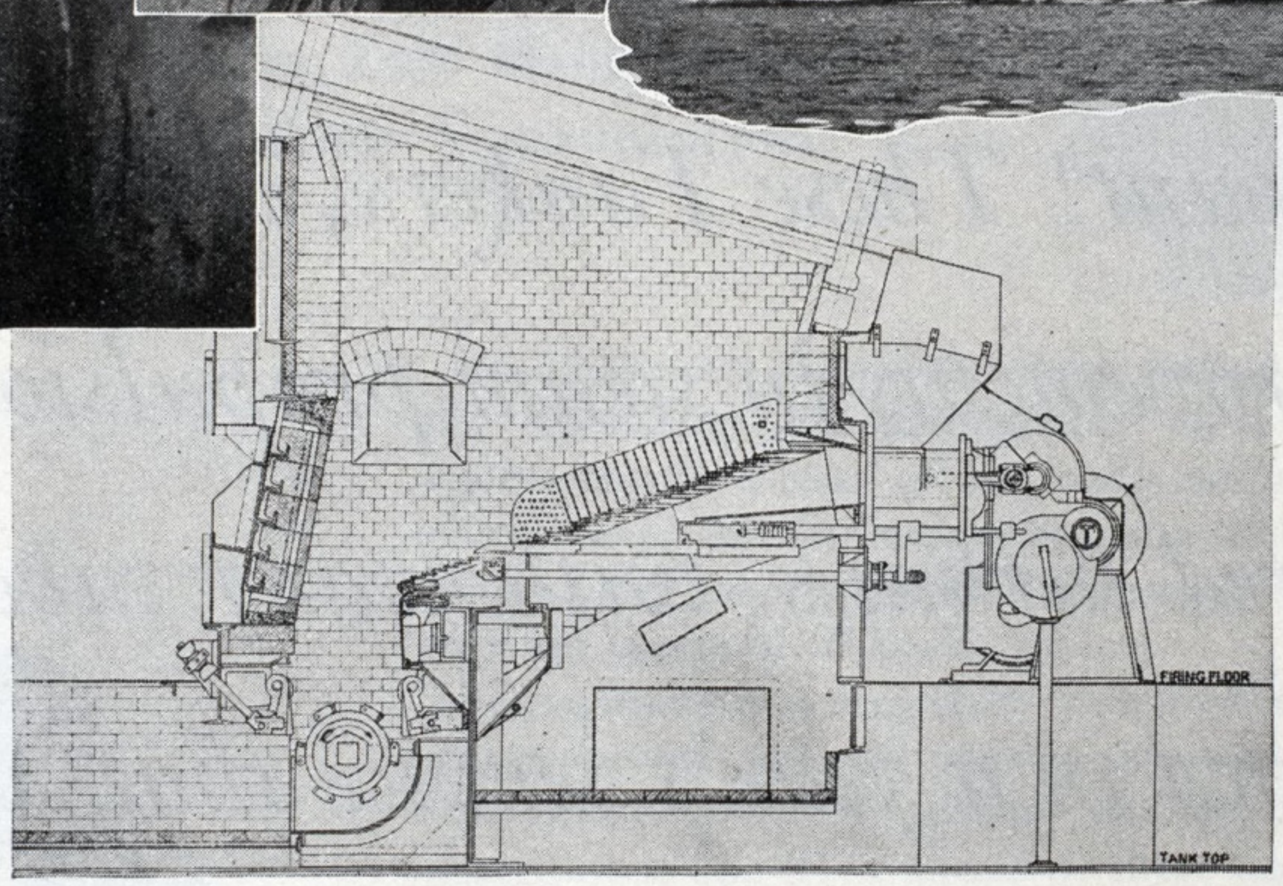


Upper right—Interior of furnace on the "Beaverhill", showing Taylor Stoker.

Upper left—Firing aisle in boiler room of the "Beaverhill." Note the clean-cut appearance of the Taylor Stoker driving mechanism.

Right—Cross-section of stoker-fired furnace on "Beaverhill."

Inset—The "Beaverhill."



AMERICAN ENGINEERING COMPANY · PHILADELPHIA · A-E-CO

Proved ashore, it makes good at sea . . .

For more than a year, the Taylor Stoker illustrated here has been in service on the S. S. Beaverhill, on the Canadian Pacific line between Montreal and London. The results have been so satisfactory that it has now been decided to convert the other three boilers on the "Beaverhill" to stoker firing. For many years, in hundreds of power houses ashore, the Taylor Stoker has demonstrated its efficiency and economy. The development of the Marine Type Taylor Stoker makes it possible to burn coal at sea with the same economy and convenience as on land.

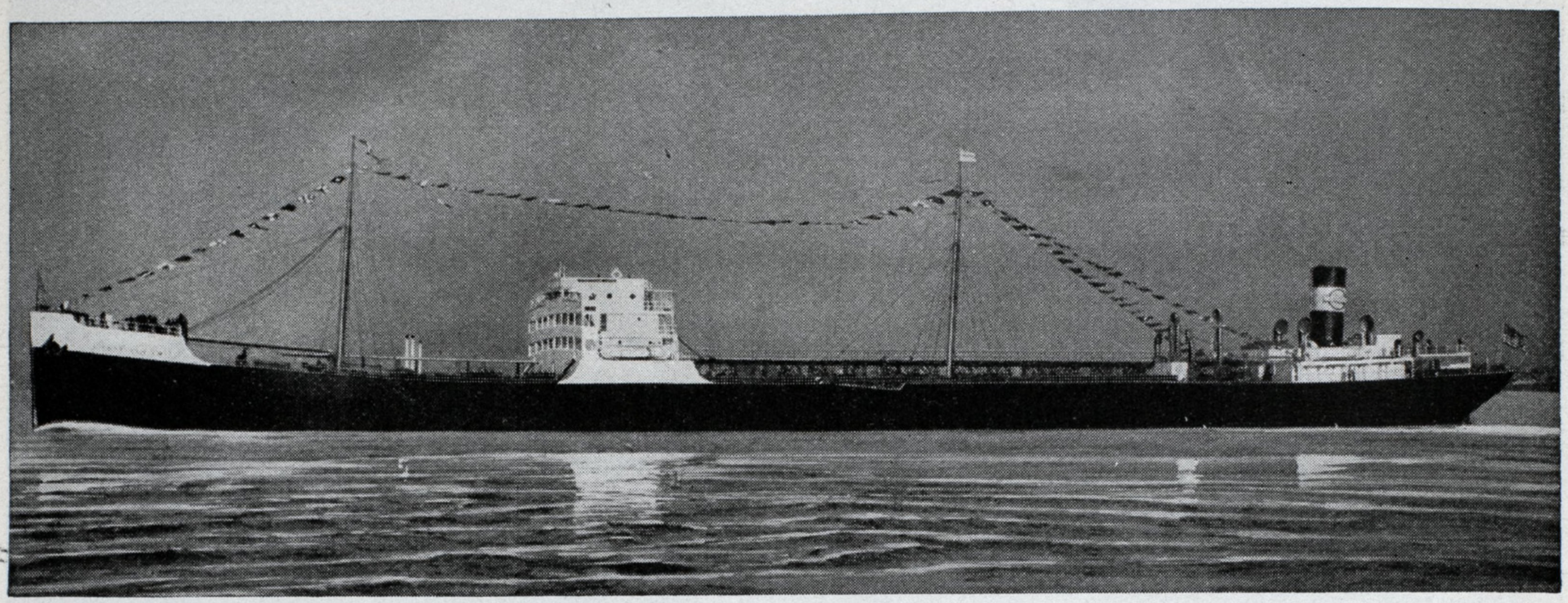
A-E-CO PRODUCTS

STEERERS WINDLASSES WINCHES CARGO HOISTS TOWING MACHINES
CAPSTANS TELEMOTORS GYPSIES ELECTRIC MONORAIL HOISTS
REFRIGERATING UNITS STOKERS—CENTRAL STATION, INDUSTRIAL, MARINE

AMERICAN ENGINEERING

AMERICAN ENGINEERING COMPANY, 2437 ARAMINGO AVENUE, PHILADELPHIA

Latest American built Tankers of Standard Oil Co., of New Jersey



20,000 ton tankers "G. Harrison Smith" and "W. S. Farish" built 1930, by Federal Shipbuilding and Dry Dock Company

Results Count! These Tankers, embodying the very latest improvements in steam propulsion...high efficiency geared turbines, with water tube boilers, have demonstrated in a year's service that considering all costs, including capital charges and maintenance, they are the most economical under the American flag.

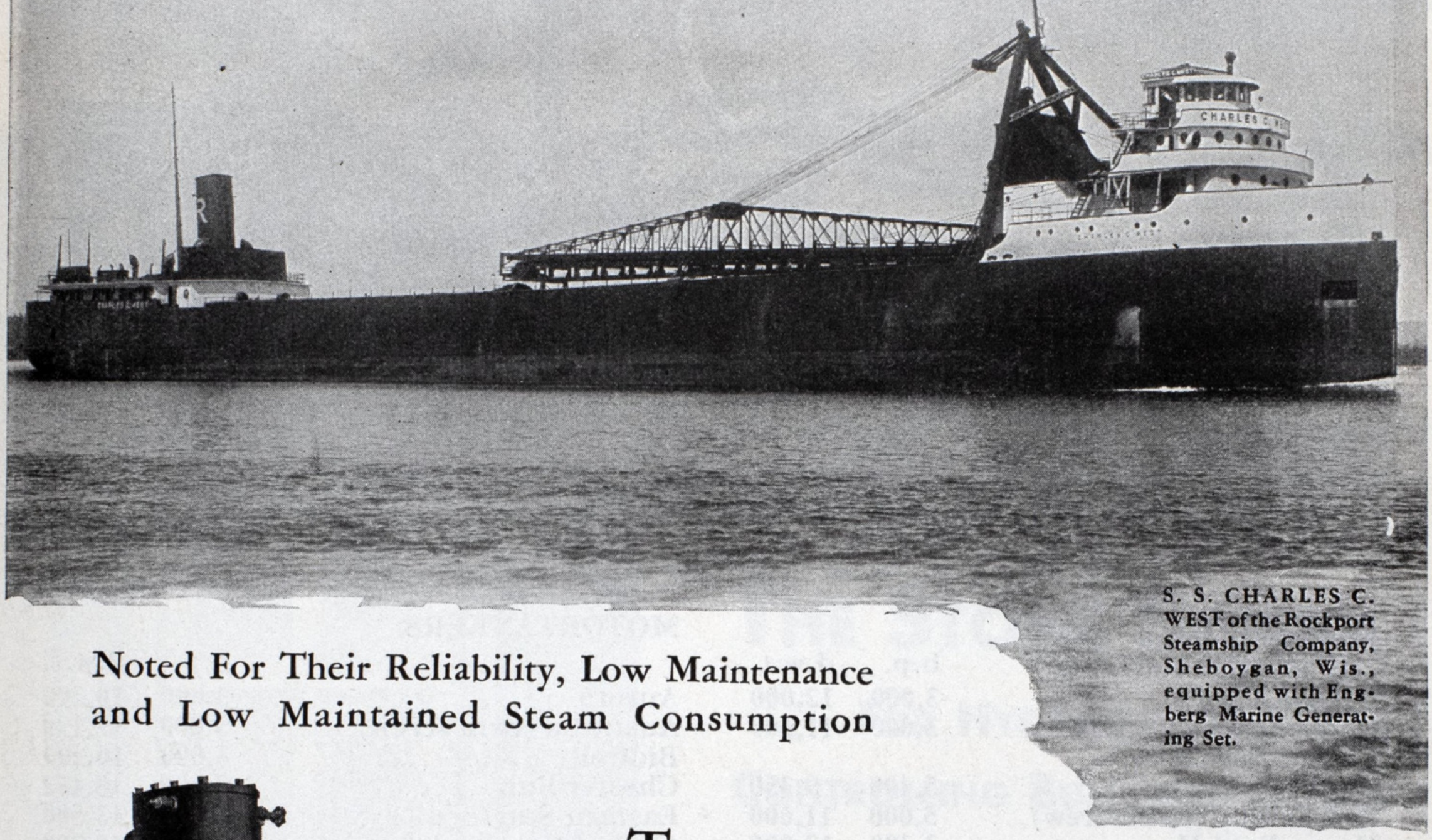
FEDERAL SHIPBUILDING AND DRY DOCK COMPANY

GENERAL OFFICES AND WORKS: LINCOLN HIGHWAY, KEARNY, NEW JERSEY

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

Engine Generating Sets . . .

CUT FUEL COSTS and GIVE LONG SERVICE



S. S. CHARLES C. WEST of the Rockport Steamship Company, Sheboygan, Wis., equipped with Engberg Marine Generating Set.

Noted For Their Reliability, Low Maintenance and Low Maintained Steam Consumption

TODAY, more than ever before, marine concerns are watching operating and maintenance costs and are selecting equipment on a basis of *reliability and economy.* And their choice invariably centers on Engberg Marine Generating Sets because *they know in advance* that steady service at minimum expense is typical of Engberg Sets.

This equipment is especially designed and constructed for marine service and will operate on a year-in-year-out schedule with little attention or upkeep. Bulletin No. 1902 gives full descriptions and illustrations of these units. Write for your copy today. No obligation, of course.

TROY ENGINE & MACHINE COMPANY

2246 Railroad Avenue » Troy, Pennsylvania

Manufacturers of

VERTICAL AND HORIZONTAL STEAM ENGINES » GENERATING SETS
GENERATORS » SWITCHBOARDS

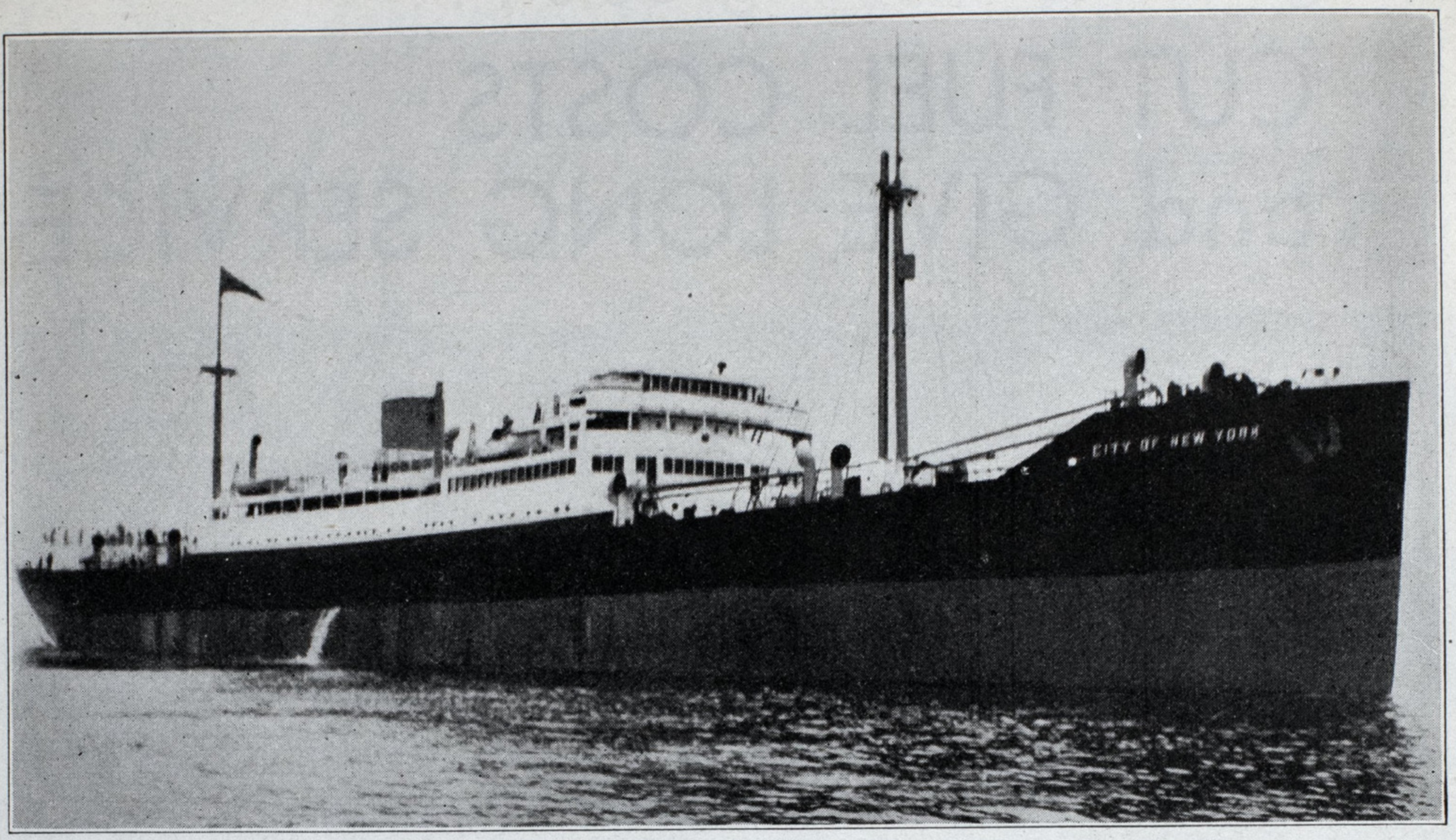
TROY - ENGBERG

MARINE GENERATING SETS AND ENGINES

Pay for themselves by low cost dependable operation

M-31-6

Driven by Sun-Doxford Engines



Motor Vessels & Engines Built at SUN Yard

MOTORSHIPS (Passenger and Cargo)	h.p.	d.w.t.
Benson Ford	3,000	12,000
Challenger	3,000	11,600
City of New York (twin screw)	5,400	9,350
East Indian (twin screw)	5,000	11,600
Henry Ford II	3,300	12,000
Twin Screw Yacht Sialia	1,500	

MOTORTANKERS	h.p.	d.w.t.
Aurora	3,000	10,200
Australia (twin screw)	5,000	17,120
Bidwell	3,000	10,200
Chester Sun	2,800	13,452
Eastern Sun	3,000	13,500
Gulf of Venezuela	3,000	10,200
Pacific Sun	3,000	13,500
Sun	3,000	13,500
Sunoil	3,000	13,500
Tide Water	3,000	13,800
Tide Water Associated	3,000	13,800
Western Sun	3,000	13,500

Builders of

Passenger and Cargo Vessels—Oil Tankers

Unlimited facilities for

MARINE REPAIRS

DRY DOCKING AND REPAIRS

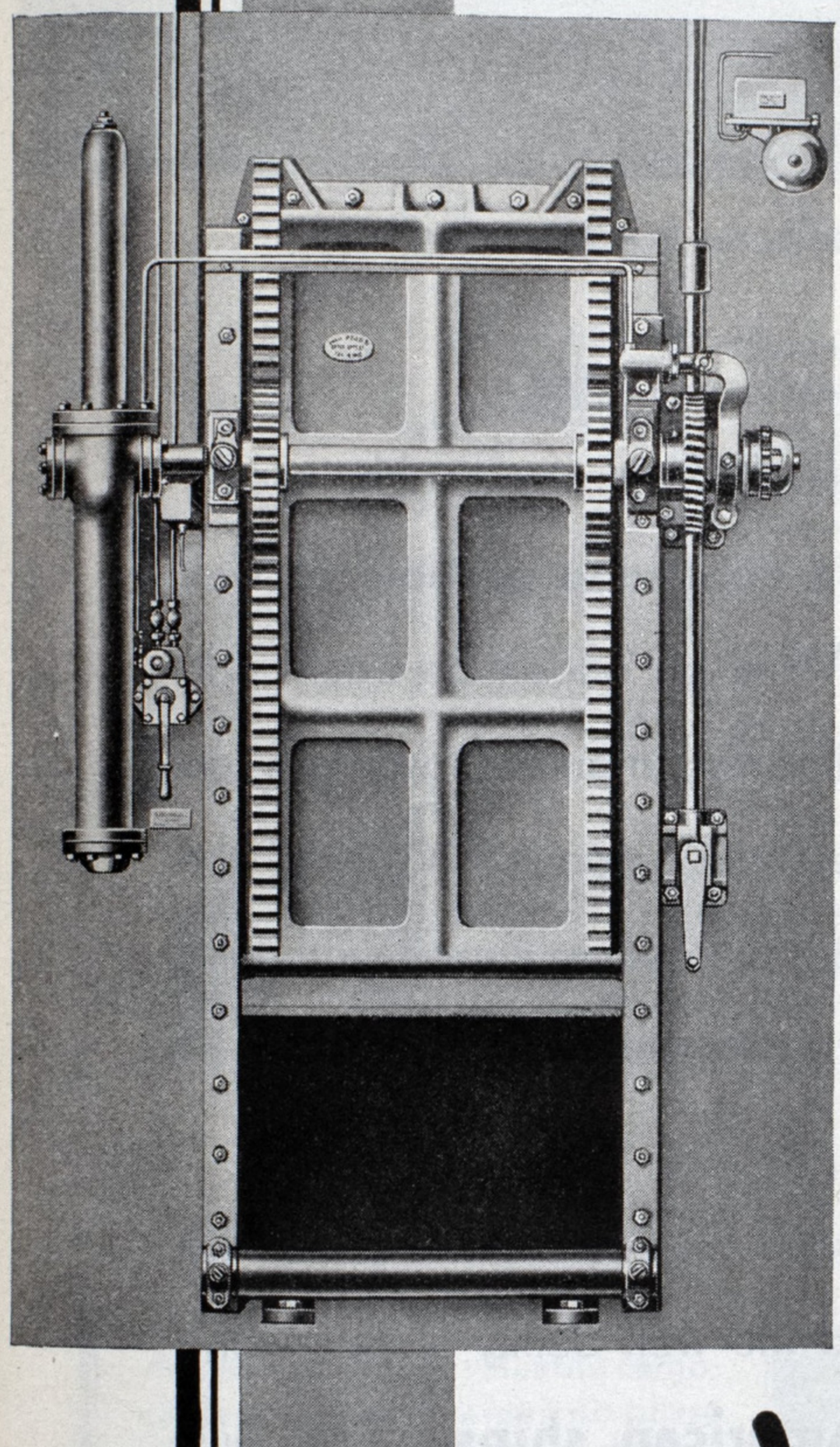
BUILDERS OF ALL TYPES OF VESSELS

Two floating Dry Docks
11,000 Tons Lifting Capacity Each

SUN SHIPBUILDING & DRY DOCK COMPANY

Shipyard & Main Office
CHESTER, PA.

25 Broadway
NEW YORK



The highly developed and perfected marine specialties devised by

J. STONE & CO., LTD.

including the latest types of

SHIP WINDOWS AND SIDELIGHTS

and the greatest single safety device for ships

THE STONE SYSTEM

FOR HYDRAULICALLY CONTROLLING BULKHEAD DOORS

are now available to American Shipowners direct from the American Locomotive Company.

Their proven **Reliability** and **Efficiency** under the most adverse conditions at sea make them the choice of the foremost Naval Architects of the world.

Sea-Tested

AMERICAN LOCOMOTIVE CO.

30 CHURCH STREET

NEW YORK, N. Y.

SPECIFY THE STARS AND STRIPES

Dollar Liner "President Fillmore" (ex "Mongolia") Built by New York Shipbuilding Company

IF we are to get and hold what we should from our wealth, needs, business and power, we must be in a position to promote as well as protect our commercial interests. With an ocean on each side and between us and the world's greatest markets, we can do neither without an up-to-date merchant marine. Where the **American flag** goes there are trade-distributing, trade-gathering agencies which mean the perpetuation and expansion of American commerce.

If the American people are to have the merchant marine that is commensurate with our welfare and the well being of our world commerce, we must **patronize American ships.** We must breathe into the hearts of American citizens a new loyalty for our own ocean carriers . . . for this **FLAG OF OURS.**

NEW YORK SHIPBUILDING COMPANY

Main Office and Works:
Camden, N. J.

New York Office:
420 Lexington Ave.

What the Gyro-Compass *means* . . .

to the Ship Owner

An opportunity—at a relatively small investment—to modernize his ENTIRE fleet, so that even his older vessels will be equal to the new in navigating efficiency.

to the Captain

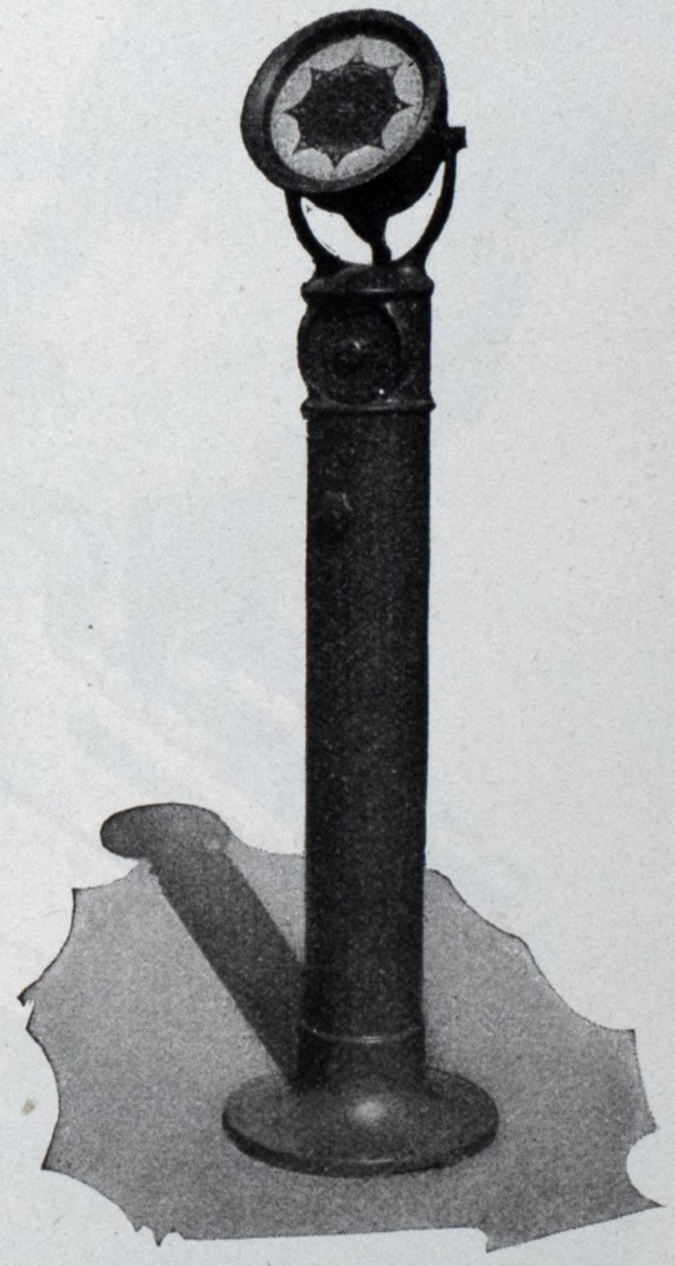
Because it is dependable, facilitates navigation, and means straighter, truer courses, the Captain regards his Gyro-Compass as an indispensable part of the vessel's navigating equipment.

to the Passenger

Every traveller has a right to expect his ship to be equipped with modern and approved aids to navigation, thus assuring a safe and expeditious passage.

to the Merchant

Assurance that his valuable cargo, carried on vessels where no phase of navigation is left to chance, will reach its destination in safety and on schedule time.



SPERRY

SPERRY GYROSCOPE CO., INC.

Brooklyn — New York

CLEVELAND
414 Rockefeller Bldg.

LOS ANGELES
524 Avalon Blvd., Wilmington

SAN FRANCISCO
58 Main Street

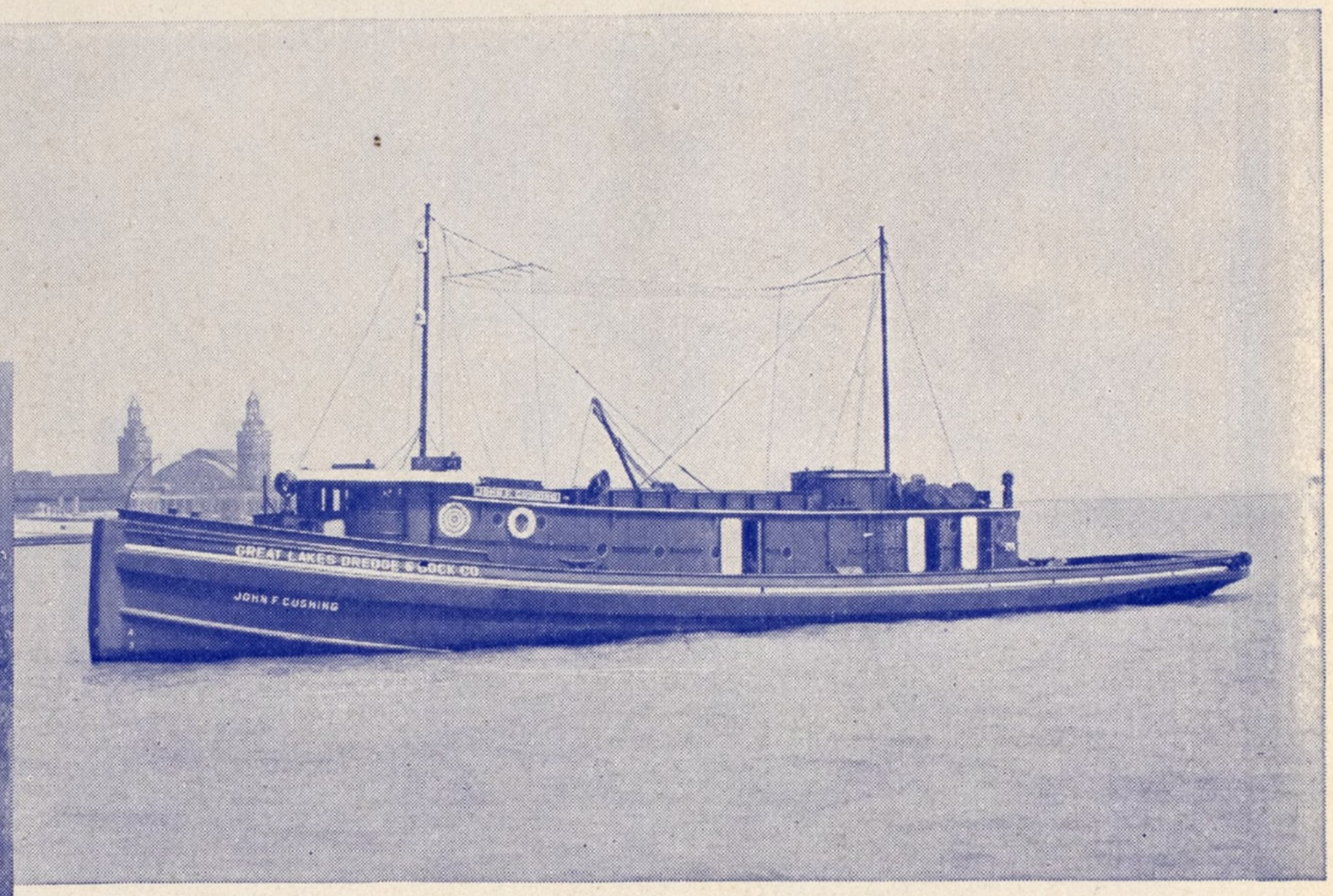
SEATTLE
2737 1st Avenue, South

READY

FOR ALL ELECTRICAL JOBS ★ ★ ★

★

Assured of current protection 1000 S. H. P. Diesel tug John F. Cushing is equipped with 60-cell Exide-Ironclad. The owners, Great Lakes Dredge & Dock Co., of which Mr. John F. Cushing is President and Mr. A. Neveling is Vice Pres. and Chief Mechanical Engineer, designed and engineered the tug. The Manitowoc Shipbuilding Corp., Manitowoc, Wis., built her.



★

Partial view of typical Exide-Ironclad Marine Battery installation. When floated on the bus, the electrical system is automatically protected against interruptions at all times. Investigate.

Exide
IRONCLAD
MARINE
BATTERIES

60-CELL EXIDE-IRONCLAD *aboard the* JOHN F. CUSHING *safeguards electric current 24 hours a day*

THE 1000 S.H.P. Diesel tug John F. Cushing need not worry about her electric current supply. During normal shutdown periods or in an emergency a 60-cell Exide-Ironclad Marine Battery is ready at a moment's notice to furnish current for the following electrical auxiliaries:

1. Emergency Air Compressor
2. Bilge Pump
3. Metal Mike
4. All Lights, Searchlights included
5. Oil Transfer Apparatus
6. Oil Purifier
7. Wireless Transmitter and Receiver
8. Electric Steering Gear
9. Lubricating Oil Pumps

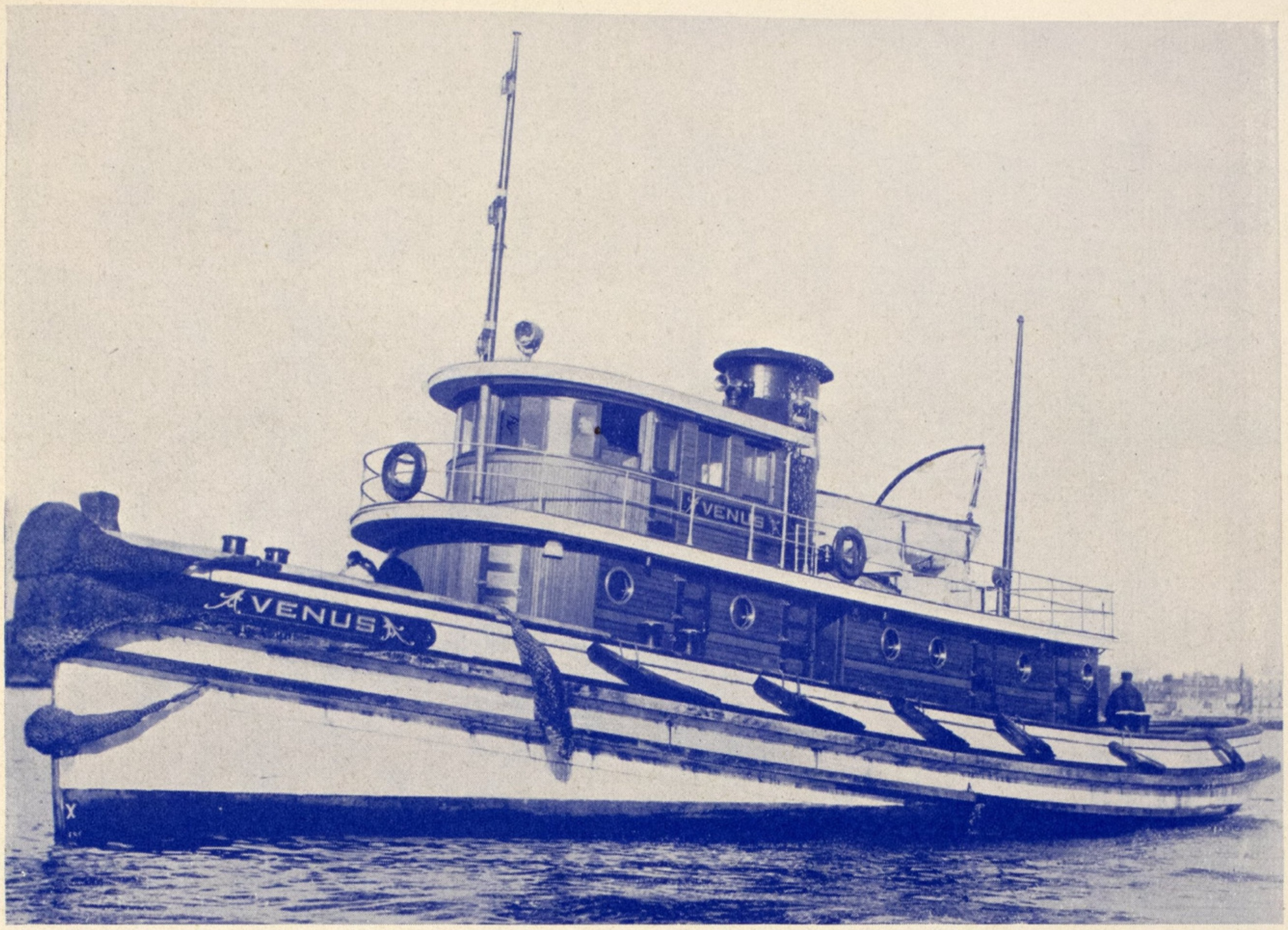
Not just on the John F. Cushing, but on every type of vessel . . . from dredge to ocean liner . . . you'll find Exides handling many jobs with dependability and economy. For increased safety, economy and convenience of operation up-to-date owners and skippers are installing the Exide Marine Floating Battery System. This assures absolute, automatic current protection at all times.

Learn more about Exides and the Floating Battery System. Write for bulletin, "Exide Batteries for Commercial Vessels." Or, have an Exide representative call. There's one handy to every coast and inland port. He'll be glad to talk over your problems with you. No obligation.

THE ELECTRIC STORAGE BATTERY COMPANY, Philadelphia

THE WORLD'S LARGEST MANUFACTURERS OF STORAGE BATTERIES FOR EVERY PURPOSE

Exide Batteries of Canada, Limited, Toronto



Towboat Venus. L.O.A., 96 ft. Breadth moulded, 24 ft. Draft, 11 ft., 6 in. Displacement loaded, 335 tons. Bunker fuel capacity, 21 tons

WINTON-DIESEL ELECTRIC DRIVE

Winton-Diesel Electric Drive power plants installed in the towboat *Venus* and her sister ship *Luna* represent the latest development in marine engineering applied to the largest, most rugged hulls practicable for use in Boston Harbor. The two vessels are owned by the Mystic Steamship Company. *Venus* was built by William G. Abbott Shipbuilding company, Milford, Delaware; *Luna* by M. M. Davis and Son, Solomons, Maryland. The handling and maneuvering of these two towboats are reported as perfect, and the precision possible in the operation from the pilot house control has been a revelation to the operators. When towing or handling the larger ships in the harbor, each vessel does the work formerly handled by two steam tugs. Main engines in each boat are two 330 b.h.p. Winton-Diesels direct-connected to 213 k. w. generators and 25 k. w. exciters. Propulsion motor is a double armature unit, 516 h.p. at 125 r.p.m. The two vessels, coupled with other outstanding work boat installations, portray the suitability of advanced type Winton-Diesel Engines for modern towboats, tankers, dredges, and freight boats of all kinds.

WINTON ENGINE CORPORATION, CLEVELAND, OHIO U. S. A.

COOPER-BESSEMER ENGINES CHOSEN FOR FORD SHIP

Ford's latest motorship, *Lake Osweya*. powered with three Cooper-Bessemer 75 K.W. diesel auxiliary generating sets. The conversion to diesel power was made in the yards of The Great Lakes Engineering Works.

COMMERCIAL ships today cannot afford delays. To show profits for their owners they must speed along on their routes and spend only enough time in port for unloading and loading again.

That's why Cooper-Bessemer marine diesel engines are found time and time again in the best earning motorships. For main or auxiliary power they can always be relied upon. They practically eliminate waste time for tedious adjustments or repairs.

A request will bring complete information or a representative.

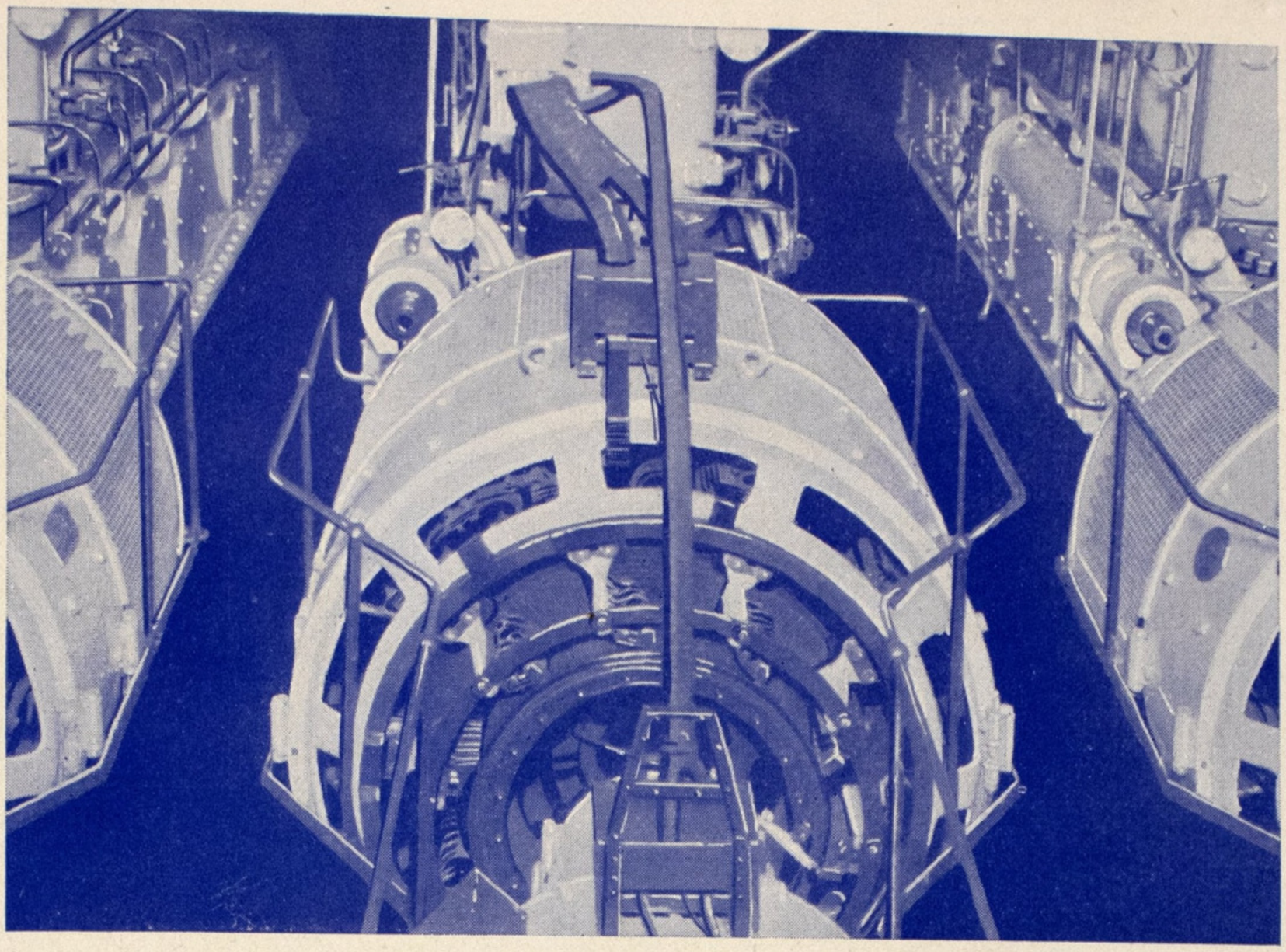
COOPER BESSEMER CB CORP.

THE COOPER-BESSEMER CORPORATION

GENERAL DIESEL SALES OFFICES: SUITE 301, 25 W. 43rd ST., NEW YORK CITY

131 State St., *Boston, Mass.* 505 Esperson Building, *Houston, Texas* 640 East 61st Street, *Los Angeles, California*
Hoffar's Lt'd., *Vancouver, B. C.* The Pacific Marine Supply Co., *Seattle, Washington*

PLANTS: MOUNT VERNON, OHIO GROVE CITY, PENNSYLVANIA



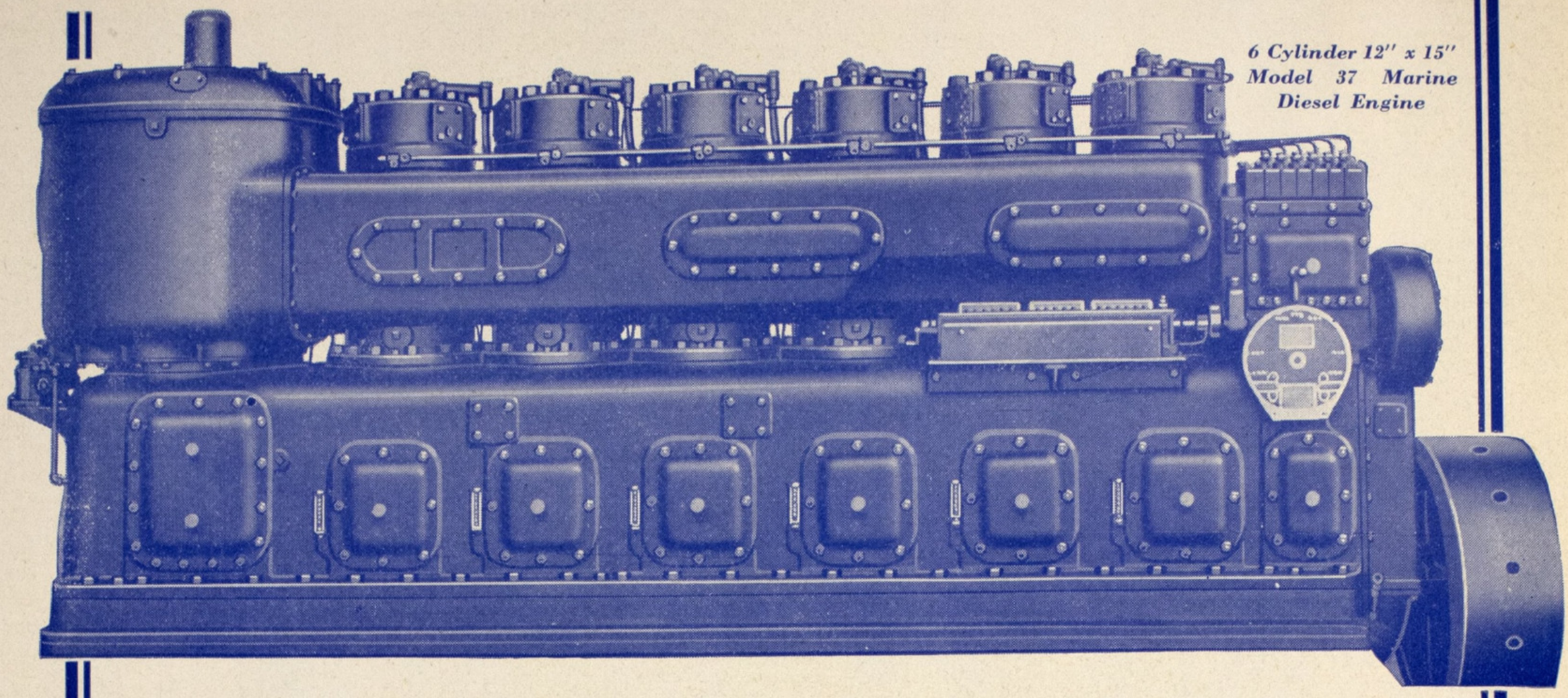
THE FLEXIBLE POWER OF DIESEL-ELECTRIC DRIVE

READILY responsive to control—with a driving force that makes light of heavy burden and bad weather—boats powered with Diesel-electric drive are winning wide favor among designers, operators, and pilots. • Especially where flexible maneuvering, instant selective command of the whole speed range, and nice response must be coupled with abundant power for every requirement, Diesel-electric drive has proved its supreme qualities in the face of the severest tests. • It is an ever dependable source of power for operating electrified auxiliaries and galley equipment and for lighting the ship. Its operating costs are low. • General Electric engineers have long coöperated in furnishing Diesel-electric drive. Their practical experience is at your service whether your needs call for Diesel-electric, turbine-electric, or turbine-gear drive. They will be glad to show you the economic advantages of a change to modern, progressive types of propulsion.

231-30

GENERAL ELECTRIC

MARINE EQUIPMENT



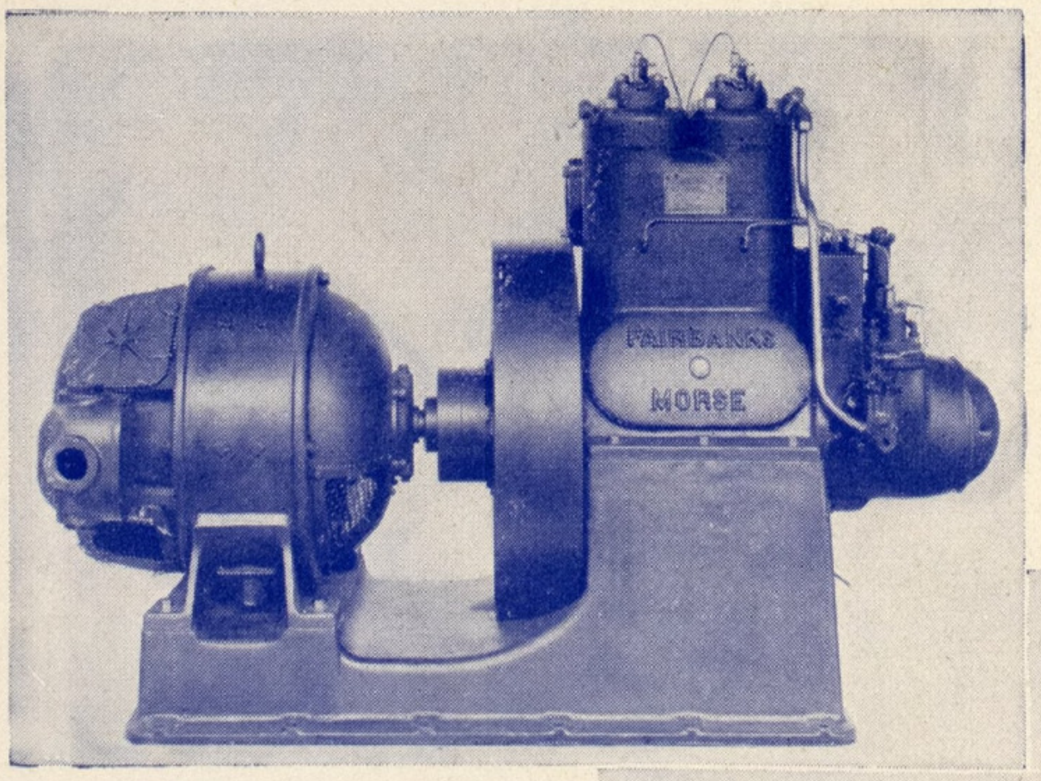
6 Cylinder 12" x 15"
Model 37 Marine
Diesel Engine

FAIRBANKS-MORSE DIESELS
8 to 1400 Horsepower

The performance record of Fairbanks-Morse Diesel Engines—in fresh and salt waters the world over—is a sure, safe guide in selecting power for new or reconditioned vessels, large or small. Choice of an F-M Diesel is assurance of "clear sailing" for years to come. These simple, perfected engines have demonstrated their ability to deliver dependable power, year in and year out—at lowest possible cost.

There is an F-M Marine Diesel to suit the main drive and auxiliary requirements of every type of fishing craft.

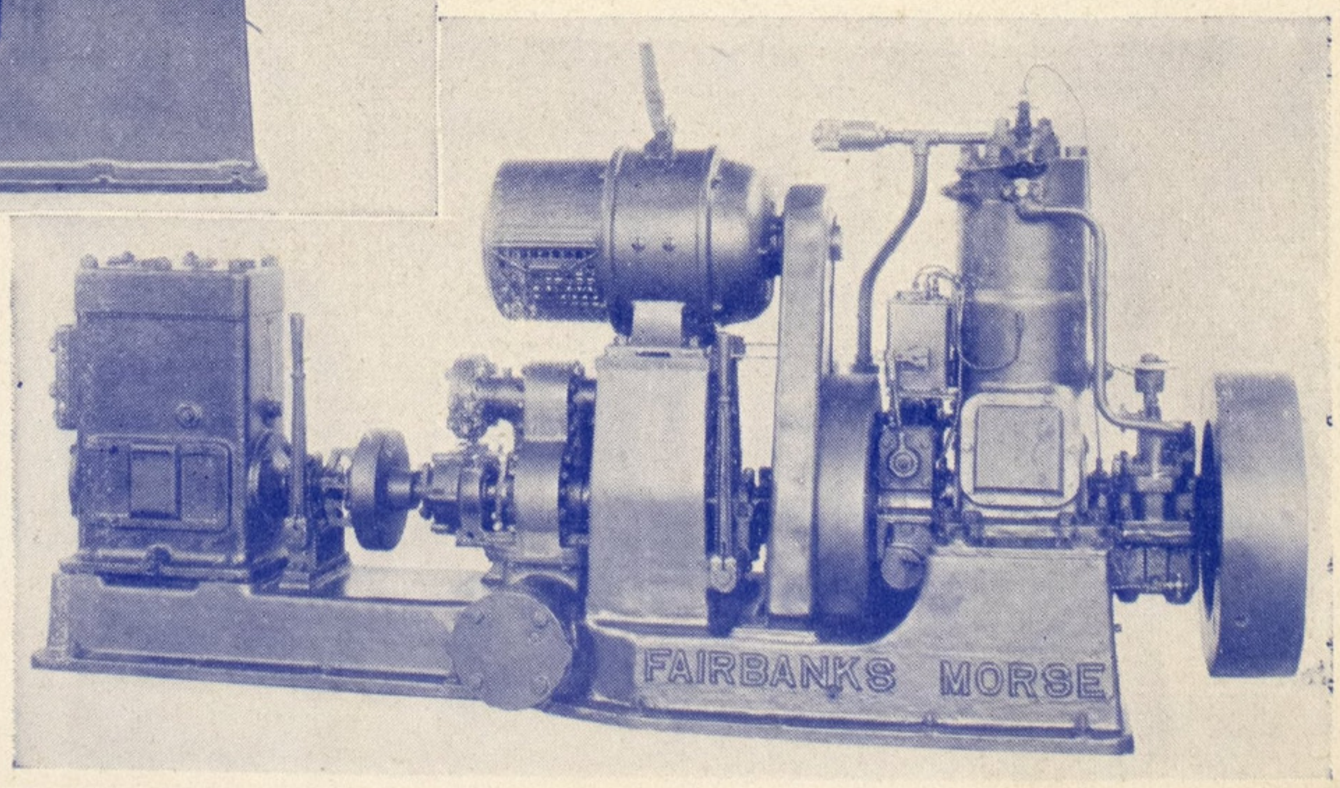
FAIRBANKS, MORSE & CO., 900 S. Wabash Ave., Chicago
Branches with service stations in principal ports



10 Kw. Auxiliary Diesel Generating Set

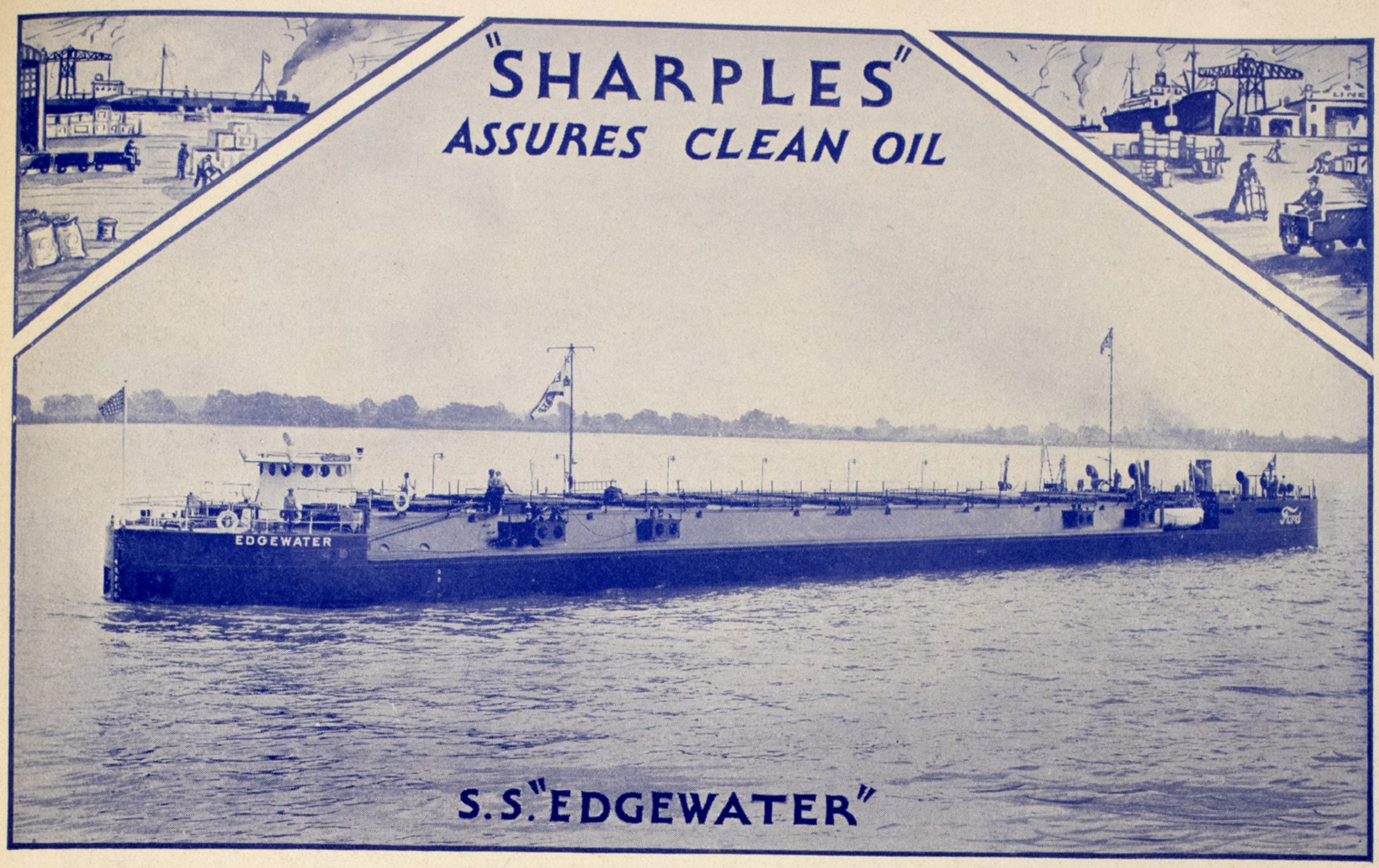
FAIRBANKS-MORSE

diesel engines



Diesel Auxiliary Set Consisting of Generator, Water Pump and Air Compressor

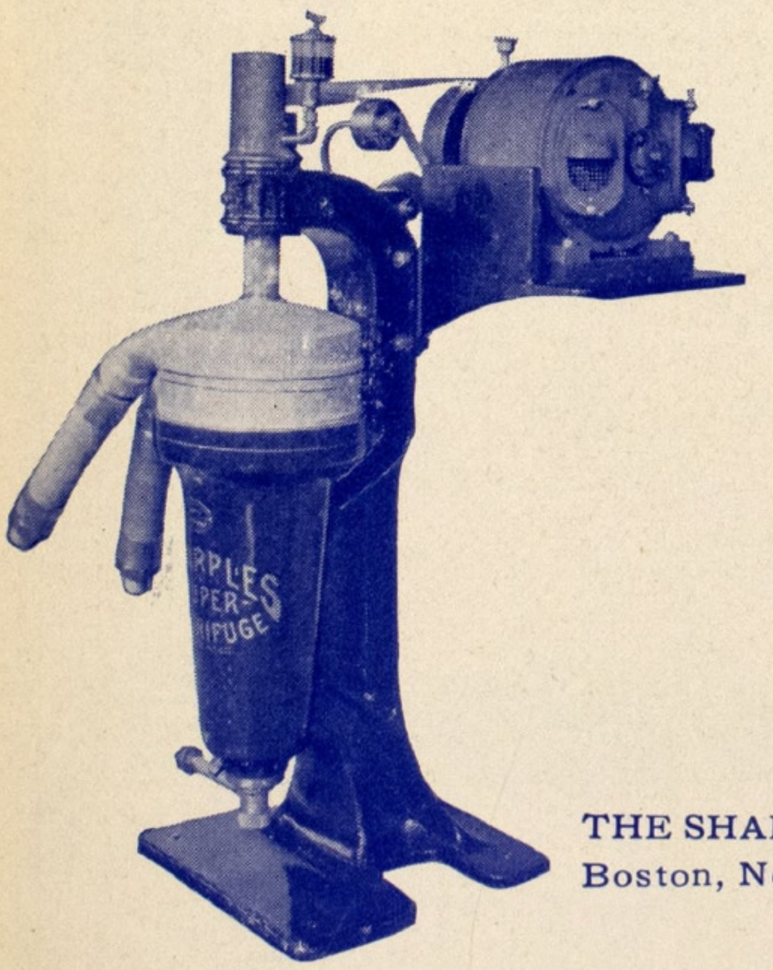
5520-OA27.376



UNIQUE FORD FREIGHTERS

S. S. "EDGEWATER" and S. S. "CHESTER"

protect their turbines against dirty oil with Sharples Super Centrifuges



The Ford Motor Company's new Freighters, S. S. "EDGEWATER" and S.S. "CHESTER"—designed by Henry J. Gielow, Inc., and built by the Great Lakes Engineering Co.—are two of the most outstanding and revolutionary achievements in modern ship construction.

The "EDGEWATER" recently started its maiden voyage with a cargo consisting of parts for 4000 complete automobiles and 400 tons of machinery. A Sharples Super Centrifuge, installed in the engine room, protects the powerful Westinghouse turbines against dirty oil and helps to insure this important cargo against delay due to faulty turbine lubrication and its resultant repairs and shut-downs.

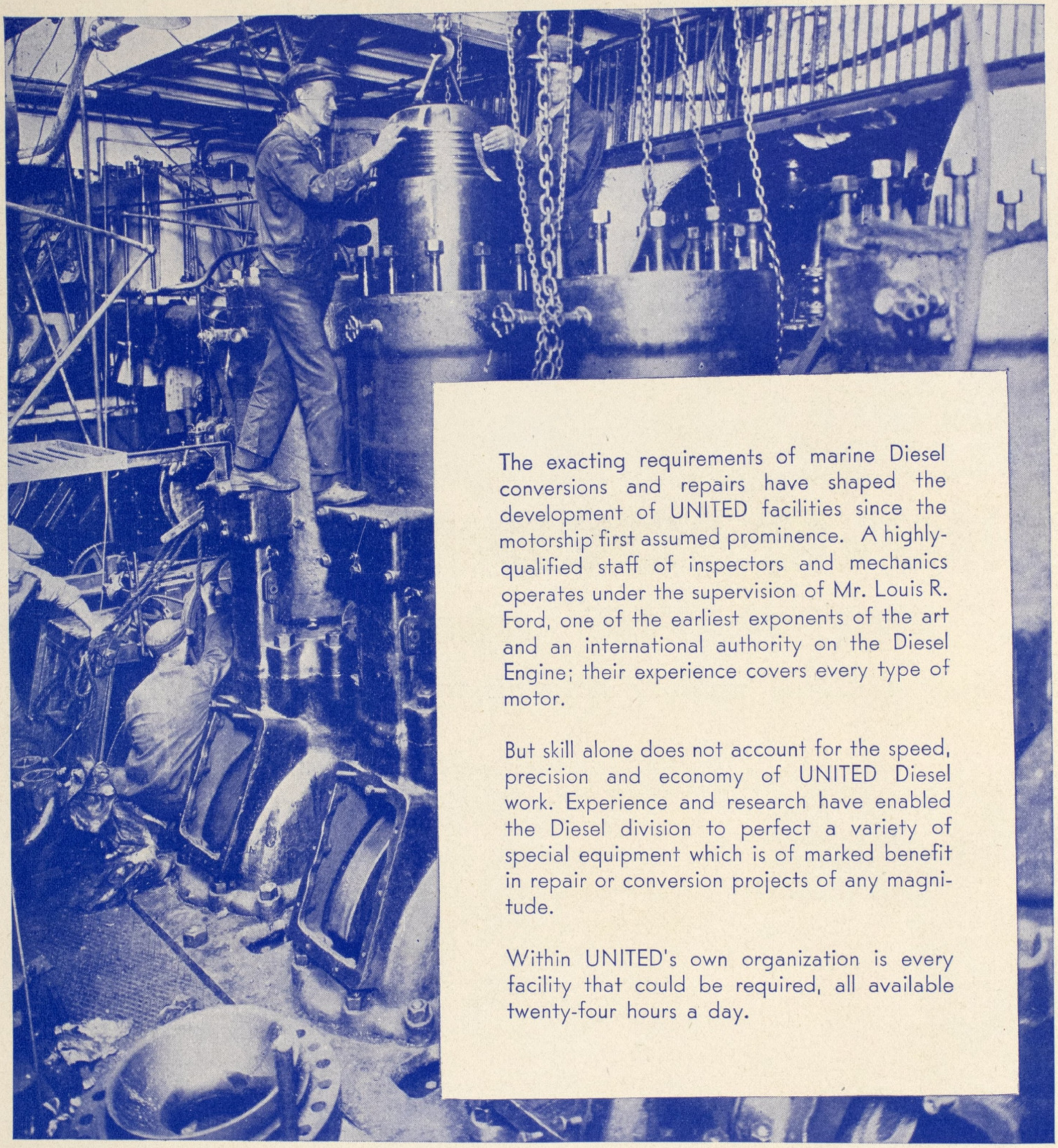
For oil purification—on lake, river or the high seas—there is no substitute for a Sharples!

THE SHARPLES SPECIALTY COMPANY, 2338 WESTMORELAND STREET, PHILADELPHIA
Boston, New York, Pittsburgh, Chicago, Detroit, Tulsa, New Orleans, San Francisco, Seattle, Los Angeles. Factories in England and France.

SHARPLES

CENTRIFUGAL ENGINEERS • • PHILADELPHIA

Expert Diesel Service
Exceptional Diesel Facilities



The exacting requirements of marine Diesel conversions and repairs have shaped the development of UNITED facilities since the motorship first assumed prominence. A highly-qualified staff of inspectors and mechanics operates under the supervision of Mr. Louis R. Ford, one of the earliest exponents of the art and an international authority on the Diesel Engine; their experience covers every type of motor.

But skill alone does not account for the speed, precision and economy of UNITED Diesel work. Experience and research have enabled the Diesel division to perfect a variety of special equipment which is of marked benefit in repair or conversion projects of any magnitude.

Within UNITED's own organization is every facility that could be required, all available twenty-four hours a day.

▼ ▼ ▼

Main Office
11 Broadway,
New York

UNITED DRY DOCKS
INCORPORATED

Staten Island
Fletcher, Morse
Crane Plants

Picture this "GIANT"

at work on YOUR jobs!

THE Elwell-Parker Type ERN Truck. It is *powerful*—far beyond the exacting demands of the day's job.

It is in *perfect balance*, but has no surplus weight.

Is is *quick and responsive*, in motion.

And, true to character, it shoulders up the load in one mighty swing, heads off on the trip and comes rolling back for more—all in those smooth, easy moves that come only from surplus power under perfect control. A new design in the steering mechanism makes steering surprisingly easy.

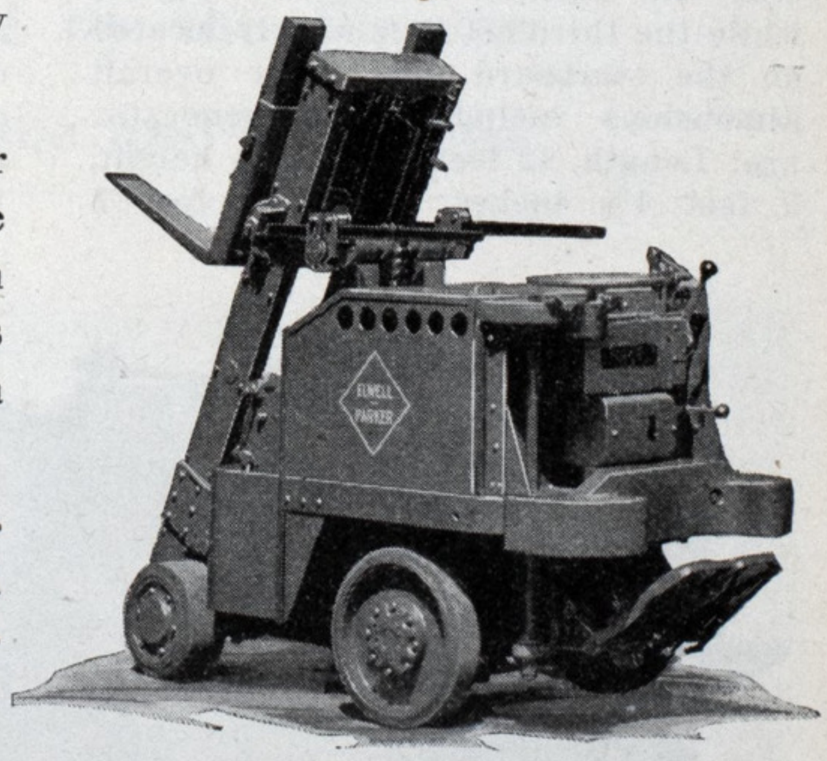
Type ERN is Elwell-Parker's heaviest duty, tilting, fork type truck. A thorough examination of these illustrations will impress you with the *thoroughness*, the *soundness*, and the *ruggedness* of its design.

Heavy duty tires, larger bearings, more powerful motors—every part is built to meet the demands of unusual service in handling loads beyond the wheelbase with or without skids. All Elwell-Parker safety features have been incorporated.

To fit the exact needs of particular fields, we also build this machine with telescoping uprights, and can furnish it with crane or with various load-handling accessories, giving it a practically universal application.

Elwell-Parker Engineers, constantly studying new trends in mechanical transportation, are soundly anticipating marine requirements years hence. Your Elwell-Parker Truck, therefore, is not merely an efficient, earning tool for *today*, but for the long reach ahead when fractional savings will be of more and more importance.

Ask us for full particulars. The Elwell-Parker Electric Company, 4200 St. Clair Ave., Cleveland, Ohio.



ELWELL-PARKER

DESIGNERS AND BUILDERS OF ELECTRIC INDUSTRIAL TRUCKS, TRACTORS AND CRANES FOR OVER A QUARTER CENTURY

a measure of pump superiority . . . .

PREFERENCE

Judged on the basis of the confidence placed in them by leading marine engineers, Warren pumps occupy a singular position. On this year's important contributions to the American Merchant Marine—the new Dollar Liners, the new Export Liners, the P & O Liner "Florida," the recent additions to the Matson Fleet and the six new units for the Great White Fleet,—complete installations of Warren pumps have been made. The long list of Warren equipped ships includes the finest now sailing the seas. This preference for Warren pumps is amply justified by the Warren reputation for performance and advanced engineering design.

WARREN

WARREN STEAM PUMP COMPANY, Inc.

WARREN . . . . . MASSACHUSETTS

Warren Engineering Corp., Agent, 117 Liberty Street, New York City
M. L. Katzenstein, President

Western Engineering Company, Agent, 58 Main Street
San Francisco, California

"I'll see it through if you will!"

"THEY tell me there's five or six million of us—out of jobs.

"I know that's not your fault, any more than it is mine.

"But that doesn't change the fact that some of us right now are in a pretty tough spot—with families to worry about—and a workless winter ahead.

"Understand, we're not begging. We'd rather have a job than anything else you can give us.

"We're not scared, either. If you think the good old U. S. A. is in a bad way more than temporarily, just try to figure out some other place you'd rather be.

"But, until times do loosen up, we've got to have a little help.

"So I'm asking *you* to give us a lift, just as I would give one to you if I stood in your shoes and you in mine.

"Now don't send me any money—that isn't the idea. Don't even send any to the Committee which signs this appeal.

"The best way to help us is to give as generously as you can to your local welfare and charity organizations, your community chest or your emergency relief committee if you have one.

"That's my story, the rest is up to you.

"I'll see it through—if *you* will!"

—Unemployed, 1931

THE PRESIDENT'S ORGANIZATION ON UNEMPLOYMENT RELIEF

Walter S. Gifford

Director

COMMITTEE ON MOBILIZATION OF RELIEF RESOURCES

Owen D. Young

Chairman

The President's Organization on Unemployment Relief is non-political and non-sectarian. Its purpose is to aid local welfare and relief agencies everywhere to provide for local needs. All facilities for the nation-wide program, including this advertisement, have been furnished to the Committee without cost.

"Where-To-Buy"

A classified-by-products list of advertisers for the convenience of readers. If you don't find what you want, write us and we will tell you where to get it. ¶Index to advertisements will give you page number of any advertiser and by referring to advertisement you can get full particulars about products.

AIR COMPRESSORS—See Compressors (Air)

AIR PREHEATERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

ANCHORS
American Engineering Co., The, Cumberland & Aramingo Sts., Philadelphia, Pa.

ARMOR (Submarine)
Morse, Andrew J., & Son, Inc., 221 High St., Boston, Mass.

BABBITT METAL
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

BARGES
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.

BARGES (Steel)
American Bridge Co., Frick Bldg., Pittsburgh, Pa.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.

BATTERIES
Electric Storage Battery Co., The, 19th and Allegheny Sts., Philadelphia.

BEARING (Rubber)
Goodrich, B. F., Rubber Co., Akron, O.

BINNACLES
Ritchie, E. S., & Sons, Brookline, Mass.

BLOWERS (Flue)
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.

BLOWERS (Turbine Driven)
Westinghouse Elec. & Mfg. Co., S. Philadelphia, Pa.

BOATS (Steel and Wood)
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.

BOILERS
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.

BOILERS (Marine)
Almy Water Tube Boiler Co., 184 Allen St., Providence, R. I.
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
Babcock & Wilcox Co., 85 Liberty St., New York City.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.
Oldman-Magee Boiler Works, Inc., 36-40 Illinois St., Buffalo, N. Y.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

BOILERS (Water Tube)
Almy Water Tube Boiler Co., 184 Allen St., Providence, R. I.
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

BOOKS (Technical)
Penton Publishing Co., Cleveland, O.

BRAKES (Electric)
tler-Hammer, Inc., 365 St. Paul Avenue, ilwaukee, Wis.

BROKERS (Vessel)
Boland & Cornelius, Marine Trust Bldg., Buffalo, N. Y.

BUNKER FUEL OIL—See FUEL OIL

BURNERS (Oil)—See OIL BURNING EQUIPMENT

CABLES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co., 46 South St., New York City.

CALKING COTTON
Stratford, Geo., Oakum Co., 120 Montgomery St., Jersey City, N. J.

FEED WATER HEATERS—See HEATERS AND PURIFIERS (Feed Water)

CAPSTANS
American Engineering Co., The, Cumberland & Aramingo Sts., Philadelphia, Pa.
Hyde Windlass Co., Bath, Me.

CAR FLOATS
American Bridge Co., Frick Bldg., Pittsburgh, Pa.

CASTINGS
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.

CHANDLERY
American Engineering Co., The, Cumberland & Aramingo Sts., Philadelphia, Pa.

COMPASSES
Ritchie, E. S., & Sons, Brookline, Mass.

COMPASSES (Gyro)
Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

COMPRESSORS (Air)
Westinghouse Air Brake Co., Wilmerding, Pa.

CONDENSERS
Dean Brothers Co., 323 W. 10th St., Indianapolis, Ind.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

CONTROLLERS (Electric)
Cutler-Hammer, Inc., 1265 St. Paul Avenue, Milwaukee, Wis.

CORDAGE
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston, Mass.
Whitlock Cordage Co., 46 South St., New York City.

DIESEL ENGINES—See ENGINES (Diesel)

DIESEL FUEL OIL—See FUEL OIL

DISTILLING APPARATUS
Griscom-Russell Co., 285 Madison Ave., New York City.

DIVING APPARATUS
Morse, Andrew J., & Son, Inc., 221 High St., Boston, Mass.

DRAFT (Artificial and Mechanical for Boilers)
American Shipbuilding Co., Foot of W. 54th St., Cleveland.

DREDGING MACHINERY
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

DRY DOCKS
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Manitowoc Shipbuilding Corp., Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.

DYNAMOS
General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

ECONOMIZERS
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

EJECTORS (Ash)
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

ENGINE SPEED INDICATORS
Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

ENGINEERS (Marine, Mechanical and Consulting)
Crandall Engineering Co., The, 134 Main St., Cambridge, Mass.
Todd Shipyards Corp., 25 Broadway, New York City.
United Dry Docks, Inc., 11 Broadway, New York City.

ENGINES
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway, Kearney, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

ENGINES (Diesel)
Busch-Sulzer Bros.-Diesel Engine Co., Second & Utah Sts., St. Louis, Mo.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Winton Engine Co., 2116 W. 106th St., Cleveland, O.

ENGINES (Internal Combustion)
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.

ENGINES (Marine)
American Shipbuilding Co., Foot of W. 54th St., Cleveland.
Busch-Sulzer Bros.-Diesel Engine Co., Second & Utah Sts., St. Louis, Mo.
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St., New York City.
New York Shipbuilding Co., Camden, N. J.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.
Todd Shipyards Corp., 25 Broadway, New York City.
United Dry Docks Inc., 11 Broadway, New York City.

ENGINES (Oil)
Cooper-Bessemer Corp., The, Mt. Vernon, O.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
Sun Shipbuilding & Dry Dock Co., Chester, Pa.

ENGINES (Vertical, Enclosed, Self Oiling)
Troy Engine & Machine Co., Troy, Pa.

EUROPEAN STEAMSHIP LINES (Passenger and Freight)
Hamburg-American Line, 39 Broadway, New York City.

EVAPORATORS
Griscom-Russell Co., 285 Madison Ave., New York City.

FANS
Diehl Mfg. Co., Elizabethport, N. J.

FANS (Electric)
General Electric Co., Schenectady, N. Y.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

FEED WATER REGULATORS
Babcock & Wilcox Co., 85 Liberty St., New York City.

FIRE BRICK
Babcock & Wilcox Co., The, 85 Liberty St., New York City.

FLOOR PLATES
Carnegie Steel Co., Carnegie Bldg., Pittsburgh, Pa.

FOUNDERS
American Shipbuilding Co., Foot of W. 54th St., Cleveland, O.
New York Shipbuilding Co., Camden, N. J.

FREIGHT SERVICE
Hamburg-American Line, 39 Broadway, New York City.

FUEL OIL
Vacuum Oil Co., 61 Broadway, New York City.

GAGES (Water)
Jerguson Gage & Valve Co., Somerville, Mass.

GEARS (Electric)
General Electric Co., Schenectady, N. Y.

GEARS (Marine Equipment)
Westinghouse Electric & Mfg. Co., So. Philadelphia. Pa.

GENERATING SETS
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.

GENERATING SETS (Direct Connected)
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

GENERATORS
Diehl Mfg. Co., Elizabethport, N. J.
Fairbanks, Morse & Co., 900 S. Wabash Ave., Chicago, Ill.
General Electric Co., Schenectady, N. Y.
Troy Engine & Machine Co., Troy, Pa.
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.

GOVERNORS
Cory, Chas., Corp., 754-70 Lexington Ave., Brooklyn, N. Y.

GREASE
Vacuum Oil Co., 61 Broadway, New York City.

GREASE (Launching)
Vacuum Oil Co., 61 Broadway, New York City.

GYPSEYS
American Engineering Co., The, Cumberland & Aramingo Sts., Philadelphia, Pa.

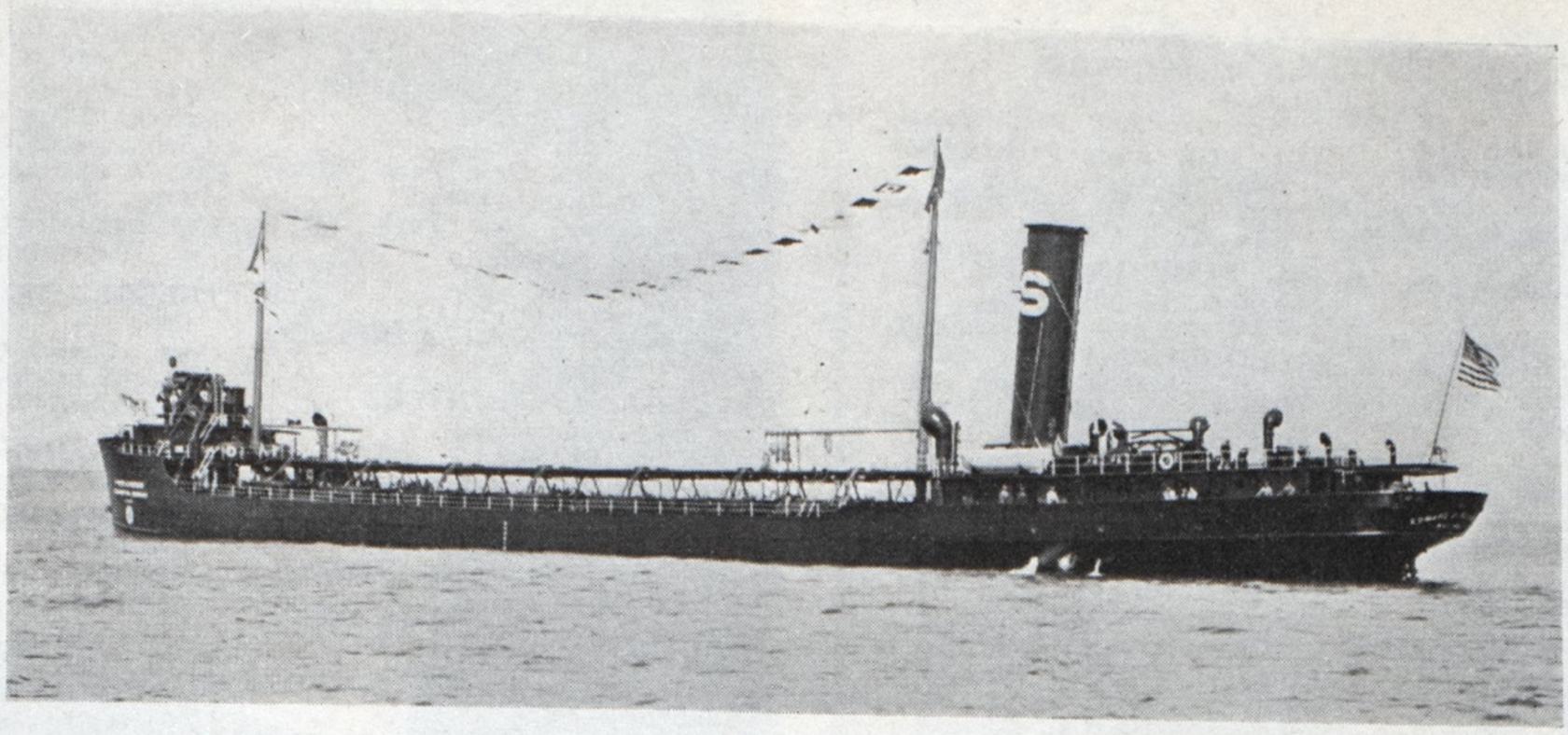
GYRO-PILOT (Automatic Steering)
Sperry Gyroscope Co., Inc., Brooklyn, N. Y.

HATCH COVERS (Steel)
MacGregor & King, Ltd., 5 Lloyd's Ave., London, E.C.3, Eng.

HAWSERS (Manila)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co., 46 South St., New York City.

HEATERS AND PURIFIERS (Feed Water)
Davis Engineering Co., 90 West St., New York City.
Griscom-Russell Co., 285 Madison Ave., New York City.
Westinghouse Electric & Mfg. Co., So. Philadelphia, Pa.

HEATING EQUIPMENT
Westinghouse Electric & Mfg. Co., S. Philadelphia, Pa.



The steel lake tanker "Edward G. Seubert," shown above, was built by us for Standard Oil Company of Indiana. This oil tanker has a carrying capacity of 42,000 barrels—it is 400' long 53' beam and 27' depth.

We design and build steel passenger and freight vessels, carferries, oil tankers, sand suckers, lighters, dredges, yachts, fire boats, tugs, derricks, scows, barges, marine engines and boilers. At this plant you will find excellent facilities, including a 600' steel floating dry dock, for ship, engine and boiler repairs.

MANITOWOC SHIPBUILDING CORPORATION

Manitowoc, Wisconsin

DEAN BROS.

MARINE PUMPS

"The Dean of Pumps on Land and Sea"

Single Style & Duplex
Piston Type & Plunger

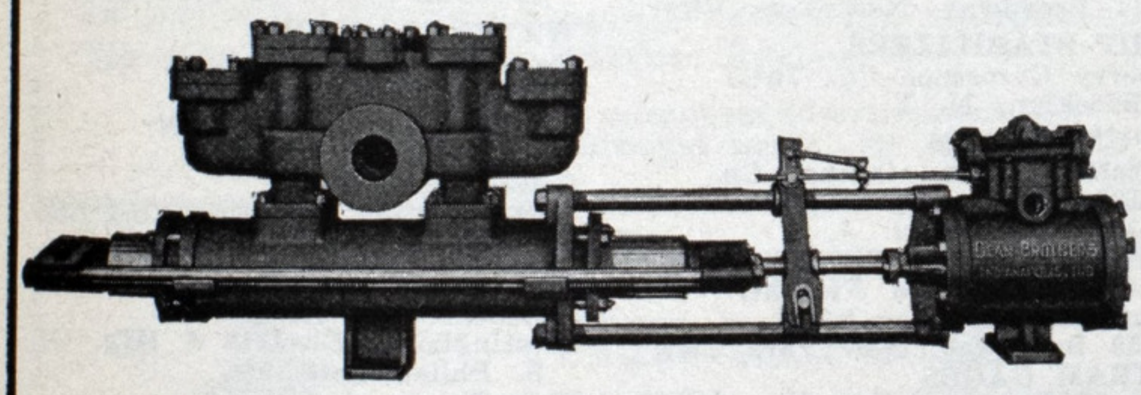


Figure No. 2311 Horizontal Single Style Double Acting Outside End Packed Plunger Trombone Pot Valve Pump For Boiler Feed & Pressure Service.

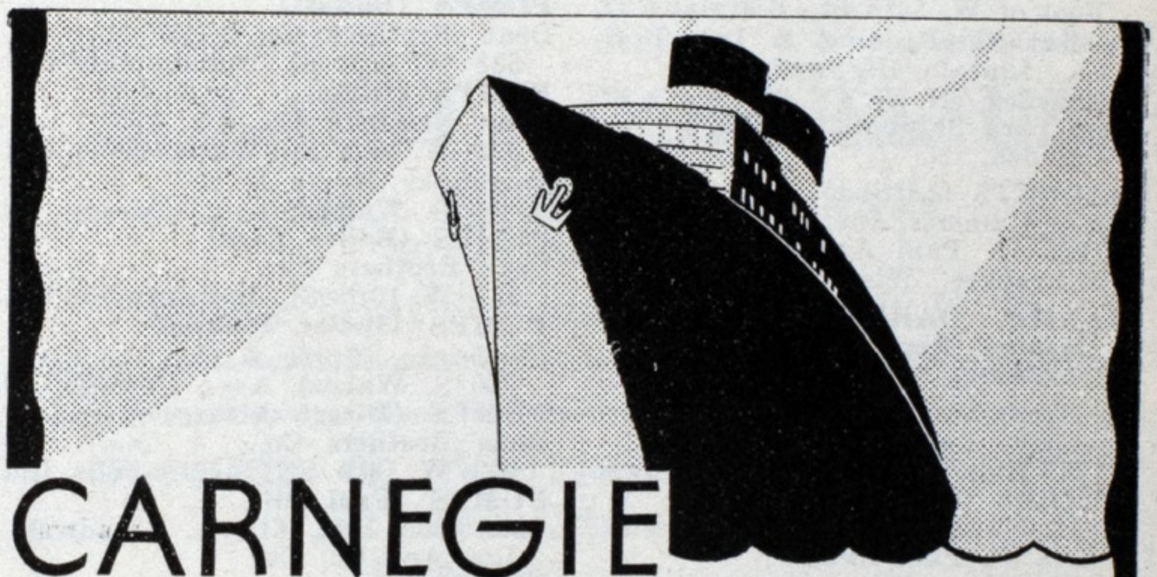
ESTABLISHED 1869

DEAN BROS. COMPANY

MANUFACTURERS OF PUMPING MACHINERY FOR ALL PURPOSES

323 WEST TENTH ST.

INDIANAPOLIS IND.



CARNEGIE SHIP BUILDING PRODUCTS

A complete line of structural steel sections for shipbuilding purposes, including Carnegie Beams with their wide, parallel flanges, shipbuilding channels and bulb angles, Carnegie Floor Plate in a raised pattern insuring long wear and easy cleaning, and rolled steel plates of every description.

The name "Carnegie" has been identified with steel manufacture for nearly three-quarters of a century—a good name to look for on Steel.

CARNEGIE STEEL COMPANY

Subsidiary of United States Steel Corporation

PITTSBURGH, PA.

62

HOISTING ENGINES
Hyde Windlass Co., Bath, Me.

HOISTS (Air)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.

HOISTS (Electric, Pneumatic, Hand)
American Engineering Co., The,
Cumberland & Aramingo Sts.,
Philadelphia, Pa.

INDICATORS (Direction & Revolution)
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

INDICATORS (Helm Angle)
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

INDICATORS (Speed)
Cory, Chas., Corp.,
754-70 Lexington Ave.,
Brooklyn, N. Y.
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

INSURANCE (Marine)
Boland & Cornelius,
Marine Trust Bldg., Buffalo, N. Y.

LAMPS (Mazda and Arc)
General Electric Co.,
Schenectady, N. Y.

LIFEBOATS
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

LIFESAVING EQUIPMENT
Lane, C. M., Lifeboat Co., Inc.,
856 Humboldt St., Brooklyn, N. Y.

LIGHTING EQUIPMENT
Cory, Chas., Corp.,
754-70 Lexington Ave.,
Brooklyn, N. Y.
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

LUBRICATING OIL
Vacuum Oil Co.,
61 Broadway, New York City.

MACHINERY (Marine)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Cooper-Bessemer Corp., The,
Mt. Vernon, O.
Manitowoc Shipbuilding Corp.,
Manitowoc, Wis.

MACHINISTS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway,
Kearney, N. J.
New York Shipbuilding Co.,
Camden, N. J.

MAGNETS (Lifting)
Cutler-Hammer, Inc.,
1265 St. Paul Avenue,
Milwaukee, Wis.

MANILA OAKUM—See OAKUM (Marine, Rope, Packings, Plumbers)

MARINE RAILWAY BUILDERS
Crandall Engineering Co., The,
134 Main St., Cambridge, Mass.

METERS (Gas & Air)
Cutler-Hammer, Inc.,
1265 St. Paul Avenue,
Milwaukee, Wis.

MOTOR GENERATOR SETS
Fairbanks, Morse & Co.,
900 S. Wabash Ave., Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

MOTORS
Diehl Mfg. Co.,
Elizabethport, N. J.

MOTORS (Electric)
Fairbanks, Morse & Co.,
900 S. Wabash Ave., Chicago, Ill.
General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
East Pittsburgh, Pa.

NAUTICAL INSTRUMENTS
Ritchie, E. S., & Sons,
Brookline, Mass.
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

NAVIGATING INSTRUMENTS
White, Kelvin & Wilfrid O., Co.,
112 State St., Boston, Mass.

OAKUM (Marine, Rope, Packing, Plumbago)
Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

OIL BURNING EQUIPMENT
Babcock & Wilcox Co.,
85 Liberty St., New York City.
Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.

OIL CLARIFIERS
Sharples Specialty Co.,
Westmoreland, Philadelphia, Pa.

OIL FOR ALL PURPOSES (Marine)
Vacuum Oil Co., 61 Broadway,
New York City.

OIL PURIFIERS
Sharples Specialty Co.,
Westmoreland, Philadelphia, Pa.

PACKING SERVICE
Export Fibreboard Case Assoc.,
155 Montgomery St.,
San Francisco, Cal.

PACKING CASES (Fibreboard)
Export Fibreboard Case Assoc.,
155 Montgomery St.,
San Francisco, Cal.

PASSENGER SERVICE
Hamburg-American Line,
39 Broadway, New York City.

POWDERED COAL BURNERS
Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.

PROPELLER BLADES AND HUBS
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLER WHEELS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland, O.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
Reading, E. H.,
226 Ohio St., Buffalo, N. Y.
Sheriffs Mfg. Co., Milwaukee, Wis.

PROPELLERS
Hyde Windlass Co., Bath, Me.
Newport News Shipbuilding & Dry-Dock Co., 90 Broad St.,
New York City.

PULVERIZED COAL BURNERS
Todd Shipyards Corp.,
25 Broadway, New York City.

PULVERIZED COAL SYSTEMS
Todd Shipyards Corp.,
25 Broadway, New York City.

PUMPS
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 S. Wabash Ave., Chicago, Ill.

PUMPS (Ballast)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PUMPS (Bilge)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Fairbanks Morse & Co.,
900 S. Wabash Ave., Chicago, Ill.

PUMPS (Boiler Feed)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PUMPS (Boiler Pumps)
Fairbanks, Morse & Co.,
900 S. Wabash Ave., Chicago, Ill.

PUMPS (Direct Acting)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PUMPS (Fuel Oil)
Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.

PUMPS (Power)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 S. Wabash Ave., Chicago, Ill.

PUMPS (Steam)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.
Fairbanks, Morse & Co.,
900 S. Wabash Ave., Chicago, Ill.

PUMPS (Vacuum)
Dean Brothers Co.,
323 W. 10th St., Indianapolis, Ind.

PURIFICATION SYSTEMS—See WATER PURIFICATION SYSTEMS

PURIFIERS (Oil)
Sharples Specialty Co.,
Westmoreland, Philadelphia, Pa.

RAILWAY DRY DOCKS
Crandall Engineering Co., The,
134 Main St., Cambridge, Mass.

REPAIRS (Electric)
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

REPAIRS (Marine)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Chicago Shipbuilding Co.,
So. Chicago, Ill.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway,
Kearney, N. J.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
New York Shipbuilding Co.,
Camden, N. J.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
United Dry Docks, Inc.,
11 Broadway, New York City.

REPAIRS (Turbine)
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

REVOLUTION COUNTERS
Sperry Gyroscope Co.,
Brooklyn, N. Y.

ROPE (Manila, Net, Sisal, and Other Hard Fiber Cordage)
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co.,
46 South St., New York City.

ROPE (Transmission)
Columbian Rope Co.,
Auburn, N. Y.

ROPE OAKUM
Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

RUST PREVENTATIVE (Oil)
Vacuum Oil Co., 61 Broadway,
New York City.

SAFETY VALVES (Marine)
Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

SCHOONERS (Auxiliary)
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.

SEARCHLIGHTS
General Electric Co.,
Schenectady, N. Y.

SEARCHLIGHTS (High Intensity)
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

SEARCHLIGHTS (Incandescent and Arc)
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

SEPARATORS (Oil)
Babcock & Wilcox Co.,
85 Liberty St., New York City.
Sharples Specialty Co.,
Westmoreland, Philadelphia, Pa.

SHIPBUILDERS
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Federal Shipbuilding & Dry Dock Co., Lincoln Highway,
Kearney, N. J.
Manitowoc Ship Building Corp.,
Manitowoc, Wis.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
New York Shipbuilding Co.,
Camden, N. J.
Sun Shipbuilding & Dry Dock Co.,
Chester, Pa.
Todd Shipyards Corp.,
25 Broadway, New York City.
United Dry Docks, Inc.
11 Broadway, New York City.

SHIP STABILIZERS
Sperry Gyroscope Co., Inc.,
Brooklyn, N. Y.

SPUN OAKUM
Stratford, Geo., Oakum Co.,
120 Montgomery St.,
Jersey City, N. J.

STEAMSHIP LINES (Passenger and Freight)
Hamburg-American Lines,
39 Broadway, New York City.

STEAM GAGES
Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

STEAM TRAPS
Davis Engineering Co.,
90 West St., New York City.

STEEL BARGES—See BARGES (Steel)

STEERING ENGINES
Hyde Windlass Co., Bath, Me.

STEERING GEARS
American Engineering Co., The,
Cumberland & Aramingo Sts.,
Philadelphia, Pa.
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Hyde Windlass Co., Bath, Me.

STOKERS
Babcock & Wilcox Co., The,
85 Liberty St., New York City.

STORAGE BATTERIES—See BATTERIES

STRAINERS (Oil)
Coen Co., Inc., 610 S. Broadway,
Los Angeles, Cal.

SUPERHEATERS
Babcock & Wilcox Co., The,
85 Liberty St., New York City.

SWITCHBOARDS
General Electric Co.,
Schenectady, N. Y.
Troy Engine & Machine Co.,
Troy, Pa.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

TELEGRAPH (Electrical, Mechanical)
Cory, Chas., Corp.,
754-70 Lexington Ave.,
Brooklyn, N. Y.

TELEMOTORS
Hyde Windlass Co., Bath, Me.

TELEMOTORS (Hydraulic & Electric)
American Engineering Co., The,
Cumberland & Aramingo Sts.,
Philadelphia, Pa.

TELEPHONE SYSTEMS
Cory, Chas., Corp.,
754-70 Lexington Ave.,
Brooklyn, N. Y.

TOWING & MOORING ENGINES
American Engineering Co., The,
Cumberland & Aramingo Sts.,
Philadelphia, Pa.

TOWING LINES
Columbian Rope Co., Auburn, N. Y.
Whitlock Cordage Co.,
46 South St., New York City.

TRACTORS
Elwell-Parker Electric Co., The,
4205 St. Clair Ave., Cleveland, O.

TRANSMISSION (Rope)—See ROPE (Transmission)

TRUCKS
Elwell-Parker Electric Co., The,
4205 St. Clair Ave., Cleveland, O.

TURBINES (Electric)
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

TURBINES (Marine)
Federal Shipbuilding & Dry Dock Co., Lincoln Highway,
Kearney, N. J.
General Electric Co.,
Schenectady, N. Y.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

TURBINES (Steam)
DeLaval Steam Turbine Co.,
Trenton, N. J.
General Electric Co.,
Schenectady, N. Y.
Newport News Shipbuilding & Dry Dock Co., 90 Broad St.,
New York City.
Westinghouse Electric & Mfg. Co.,
So. Philadelphia, Pa.

TWINE AND ROPE
Columbian Rope Co., Auburn, N. Y.
Samson Cordage Works, Boston.
Whitlock Cordage Co.,
46 South St., New York City.

WATER COOLERS
General Electric Co.,
Schenectady, N. Y.

WATER PURIFICATION SYSTEMS
Griscom-Russell Co.,
285 Madison Ave., New York City.

WELDERS (Electric Arc)
General Electric Co.,
Schenectady, N. Y.
Westinghouse Electric & Mfg. Co.,
S. Philadelphia, Pa.

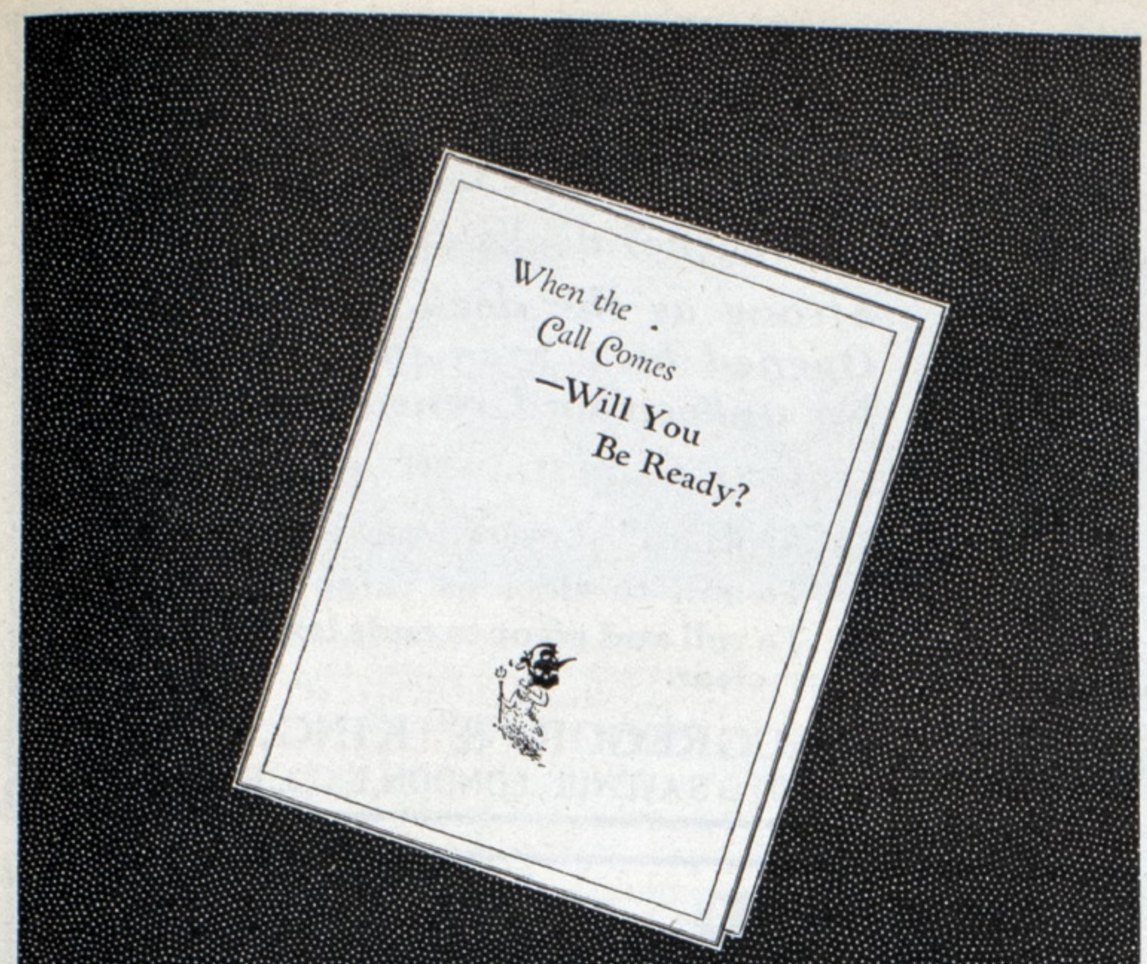
WHISTLES
Star Brass Mfg. Co.,
53 Oliver St., Boston, Mass.

WINCHES
American Engineering Co., The,
Cumberland & Aramingo Sts.,
Philadelphia, Pa.
Dake Engine Co.,
Grand Haven, Mich.
Hyde Windlass Co., Bath, Me.

WINDLASSES
American Engineering Co., The,
Cumberland & Aramingo Sts.,
Philadelphia, Pa.
American Shipbuilding Co.,
Foot of W. 54th St., Cleveland.
Hyde Windlass Co., Bath, Me.

WINDOWS (Balanced Frameless)
Kearfoot Engineering Co.,
117 Liberty St., New York City.

See Index to Advertisements for Pages Containing Advertisements of Companies Listed Above



A New Circular . . .

which should be read by every yachtsman and yacht yard owner. It has a real constructive message.

Circular sent on request

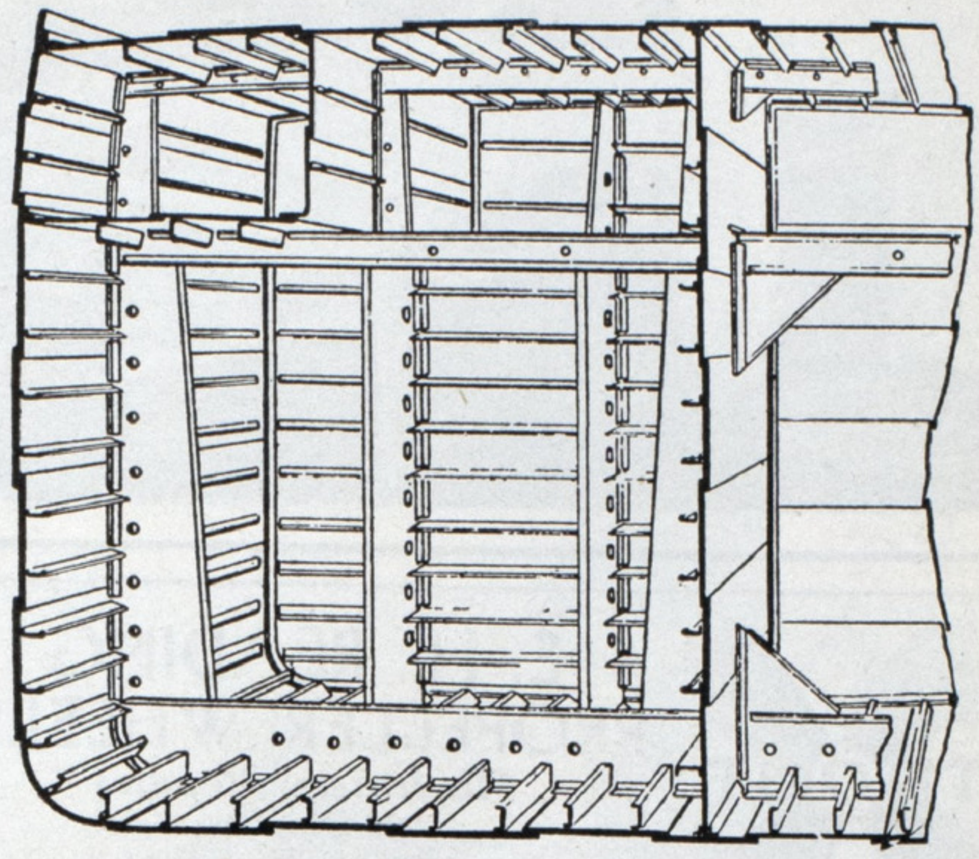
THE CRANDALL ENGINEERING CO., Cambridge, Mass., U.S.A.

Designers and Builders of FLOATING AND RAILWAY DRYDOCKS · YACHT RAILWAYS · MARINE TURNTABLES · YACHT YARD LAYOUTS · VERTICAL LIFTS

Progress in Oil-Tank Ship Construction

The "Bracketless-System"

(PATENT)



Eliminates Bulkhead Brackets
Eliminates Bulkhead Leakage
Greatly Simplifies Construction
Greatly Reduces Cost of Damage Repairs
Greatly Reduces Cost of Cleaning Tanks
Substantially Increases the Longitudinal Strength
Beyond the Well-tried "Isherwood System"

Shipowners are advised to specify that plans and structural arrangements should be approved by

SIR JOSEPH W. ISHERWOOD & CO., Ltd.

17 BATTERY PLACE, NEW YORK
and 4, LLOYD'S AVENUE, LONDON, E. C. 3

ANDREW J. MORSE & SON, Inc.

221 High Street BOSTON, MASS.
Established 1837

Diving Apparatus and Submarine Armor
Fire Protection Equipment
The Invincible Nozzle
Catalogues on request

John J. Boland Adam E. Cornelius

BOLAND & CORNELIUS

VESSEL OWNERS AND BROKERS
Marine Insurance Agents
Marine Trust Building BUFFALO, N. Y.

Ship For Sale?

If you have a passenger ship, freighter, tanker, tug or any other floating property or marine equipment for sale advertise it in Marine Review.

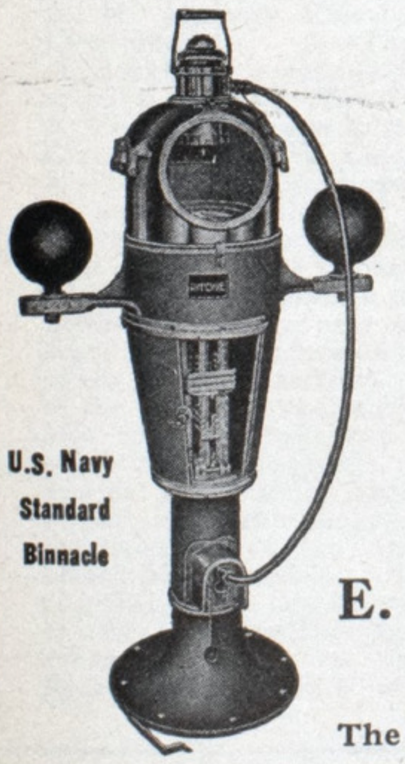
The rate is $3.00 for a minimum advertisement of thirty words. Additional words, 10c each.

Kelvin & Wilfrid O. White Co.

112 State Street, Boston

Ship Compasses
Navigational Equipment
Contracts a Specialty

New York and Montreal



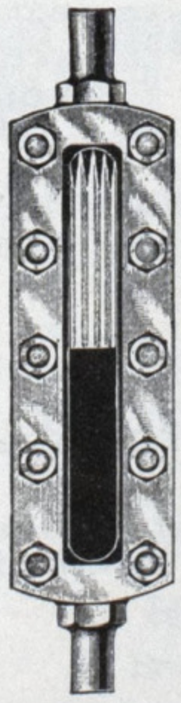
THE RITCHIE LIQUID COMPASS

The Standard Liquid Compass the world over.
Used Exclusively in U. S. Navy for over 40 years.
Over 65,000 on Merchant Vessels in all parts of the world.
Made in all sizes 2 to 12" dia.
Magnets for adjusting Purposes.

E. S. RITCHIE & SONS

Brookline, Mass., U. S. A.

Agents for the Great Lakes,
The Upson-Walton Company, Cleveland, Ohio



REFLEX WATER GAGES

Used on all types of boilers by all the Principal Navies of the world

"The Water Shows Black"

ADVANTAGES: Quick and reliable observation of the water level. Safe, sure and durable at high pressure. Not affected by cold air drafts. Most effective protection against injuries to boilers and workmen. Easily applied to all types of gage glass fittings.

When filled with **WATER** the Reflex Gage always appears **BLACK.** When empty it instantly shows **WHITE.** No mistake possible. This feature alone is worth many times the cost of the Reflex.

Send for catalog of Water Gage Apparatus

MANUFACTURED BY THE

JERGUSON GAGE & VALVE CO.

WINTER HILL, SOMERVILLE, MASS.

Classified Advertisements

For Sale

FOR SALE
WOODEN TOW BARGE N. C. HOLLAND
187′ Keel 32′ Beam 11′ 2″ Depth.
O. W. Blodgett, Bay City, Mich.

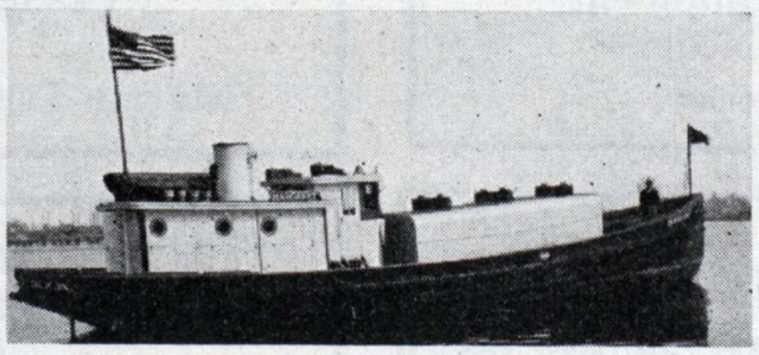
FOR SALE: SANDSUCKER KEWANEE. Capacity 110 yards. Ten inch Morris pump. Fore and aft compound engine. Scotch boiler, 150 lbs. steam. Will sell cheap as we have larger boat. Valley Sand Co., Bay City, Mich.

Wanted

WANTED: STEEL HULL, SEAGOING, EXTRA strong construction, new or used, prefer electric welded, size 65′ or longer, about 20′ beam. Full particulars and photo of boat to Kelley, 357 No. Clark St., Chicago, Ill.

For Sale

FOR SALE AT AUCTION
NOVEMBER 17TH, 1931. Steamer Mathew Wilson. Now at North Tonawanda, N. Y. For any further information, inquire Kreetan Company, North Tonawanda, N. Y.



FOR SALE: JUST COMPLETED OIL TANK delivery boat Margaret, 24,500 gal. capacity, six compartments driven by 100 H.P. Fairbanks Morse Semi Diesel Engine. If interested write E. L. Taylor, 2712 Chesterfield Blvd., Norfolk, Va.

For Sale

FOR SALE
SIDE WHEEL STR.
GREYHOUND

Length 286′—beam—overall 68′ Beam hull 36′—Capacity 2800 passengers. For price, photo and full particulars address

GEO. E. HARDY
703 Madison Ave.
Toledo, Ohio

FOR SALE
WOODEN TOW BARGE PESHTIGO
201′ Keel 37′ Beam 12′ Depth.
O. W. Blodgett, Bay City, Mich.

TO OUR SUBSCRIBERS

The classified section of MARINE REVIEW is for your convenience—its value is proving worthwhile to everyone who uses it to buy and sell.

If you want to buy or sell ships or marine equipment—need a man for your organization—make it known to the entire marine industry through the use of classified advertising in MARINE REVIEW.

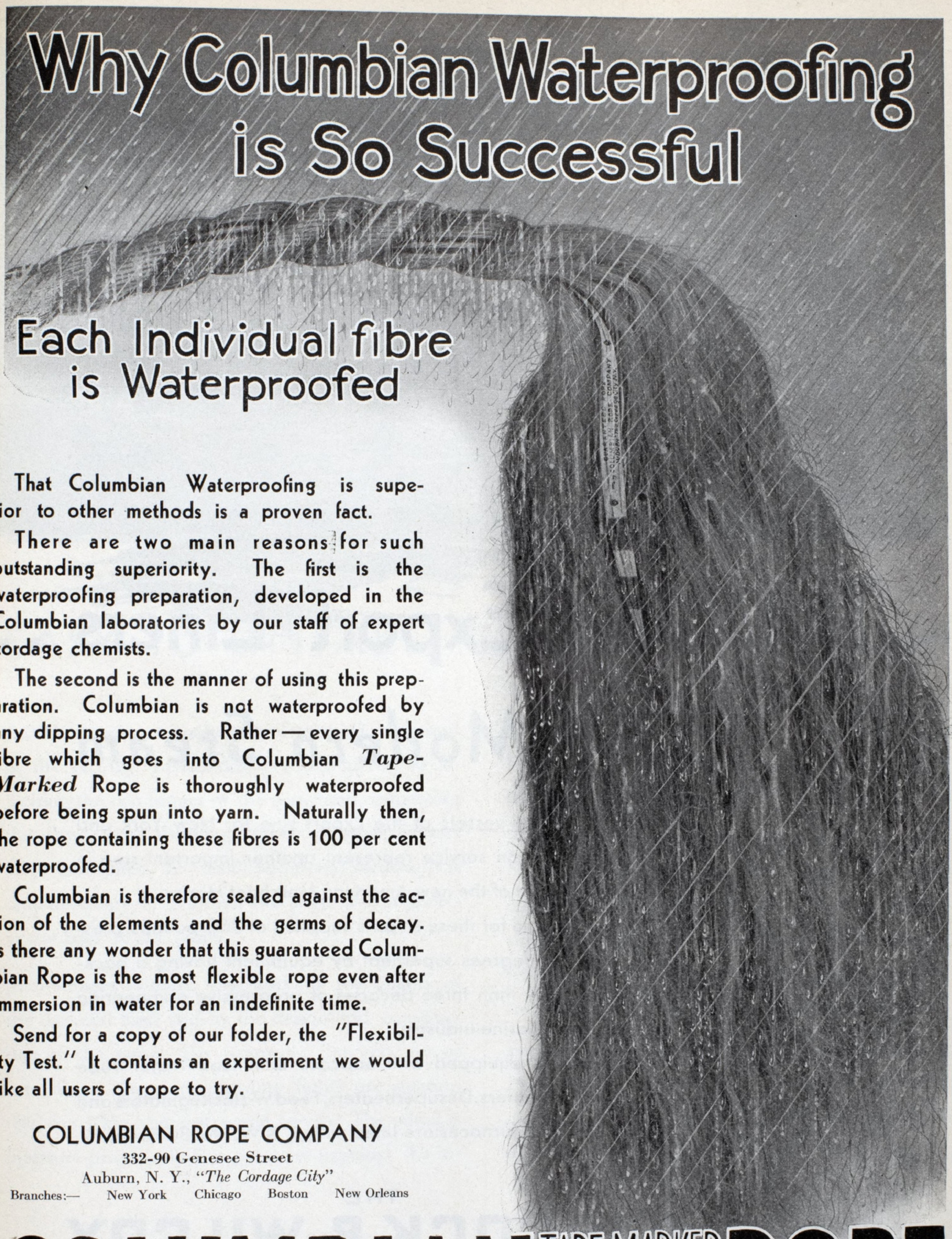
Mail copy for your advertisement in the December issue today, so it reaches us before November 20.

Statement of the ownership, management, circulation, etc., required by the act of congress of Aug. 24, 1912, of MARINE REVIEW published monthly at Cleveland, Ohio, for Oct. 1, 1931, State of Ohio, county of Cuyahoga, ss. Before me, a notary public in and for the state and county aforesaid, personally appeared J. D. Pease, who, having been duly sworn according to law deposes and says that he is the Business Manager of MARINE REVIEW and that the following is to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of Aug. 24, 1912, embodied in section 411, Postal Laws and Regulations, to wit: 1.—That the names and addresses of the publisher, editor, managing editor and business managers are: Publisher, The Penton Publishing Co., Cleveland, O. Editor, A. H. Jansson, Cleveland, O.; Business Manager, J. D. Pease, Cleveland, O. 2.—That the owners are: Names and addresses of stockholders owning or holding 1 per cent or more of the total amount of stock: The Penton Publishing Co., Cleveland, O.; John A. Penton, Cleveland, O.; C. J. Stark, Cleveland, O.; J. D. Pease, Cleveland, O.; F. V. Cole, Cleveland, O.; J. R. Dawley, Cleveland, O. 3.—That the known bondholders, mortgagees and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None. 4.—That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him. J. D. Pease. Sworn to and subscribed before me this 29th day of Sept., 1931. (Seal) H. L. Richey. (My commission expires May 7, 1933).

*

INDEX TO ADVERTISERS

Why Columbian Waterproofing is So Successful



Each Individual fibre is Waterproofed

That Columbian Waterproofing is superior to other methods is a proven fact.

There are two main reasons for such outstanding superiority. The first is the waterproofing preparation, developed in the Columbian laboratories by our staff of expert cordage chemists.

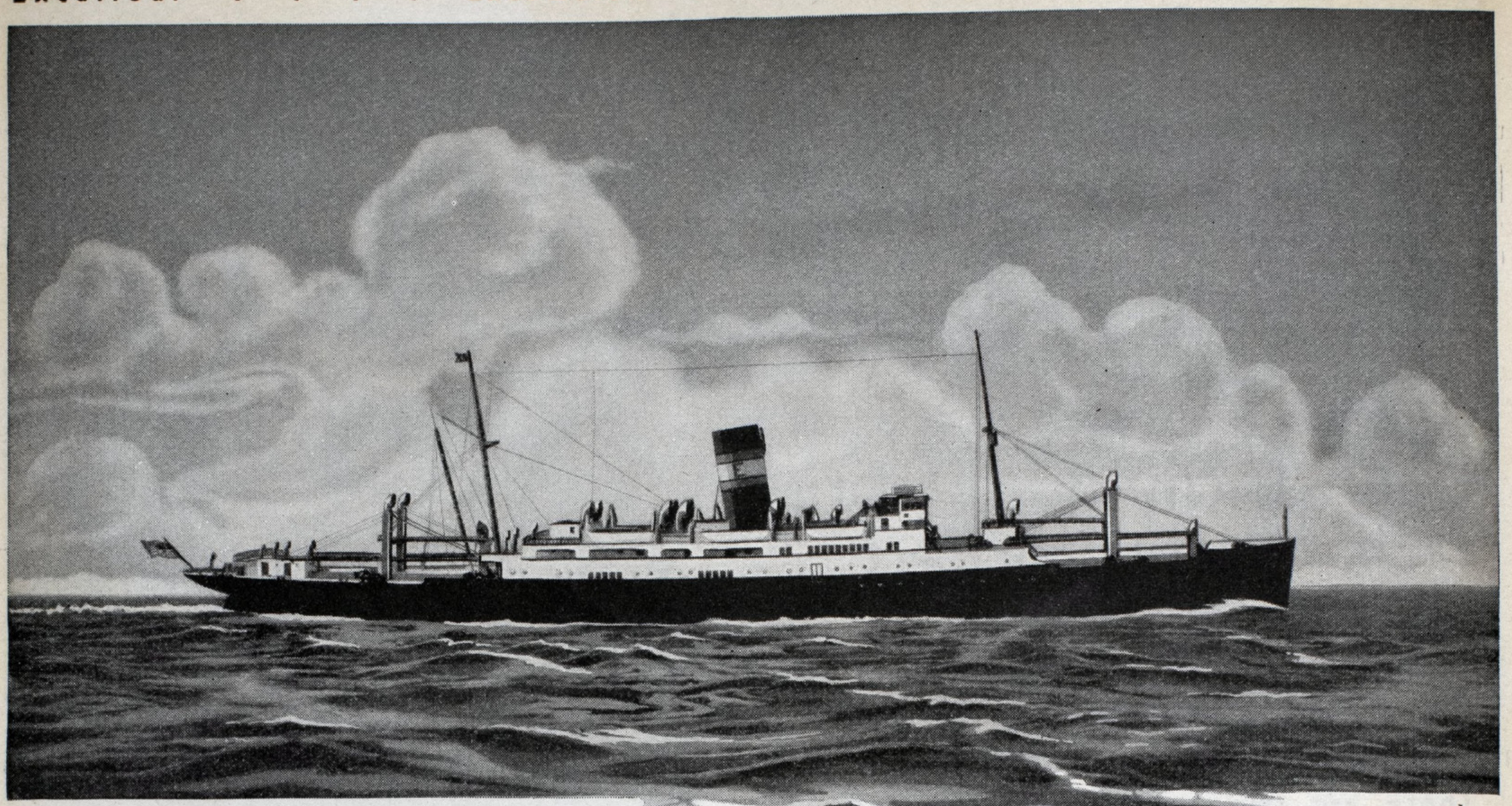
The second is the manner of using this preparation. Columbian is not waterproofed by any dipping process. Rather — every single fibre which goes into Columbian *Tape-Marked* Rope is thoroughly waterproofed before being spun into yarn. Naturally then, the rope containing these fibres is 100 per cent waterproofed.

Columbian is therefore sealed against the action of the elements and the germs of decay. Is there any wonder that this guaranteed Columbian Rope is the most flexible rope even after immersion in water for an indefinite time.

Send for a copy of our folder, the "Flexibility Test." It contains an experiment we would like all users of rope to try.

COLUMBIAN ROPE COMPANY
332-90 Genesee Street
Auburn, N. Y., *"The Cordage City"*
Branches:— New York Chicago Boston New Orleans

COLUMBIAN TAPE MARKED PURE MANILA ROPE



The New Export Liners ..

and Modern Steam

BABCOCK & WILCOX
Marine Products

Water Tube Boilers
Air Preheaters
Superheaters
Economizers
Stokers
Oil Burners
Refractories
Oil Separators

THE four new vessels of the Export Line for New York and Mediterranean service represent another important step in the development of the new American Merchant Marine.

Modern Steam for these ships is supplied at 350 pounds pressure and 200 degrees superheat by equipment having a background of more than three decades of progressive engineering service to the Marine Industry.

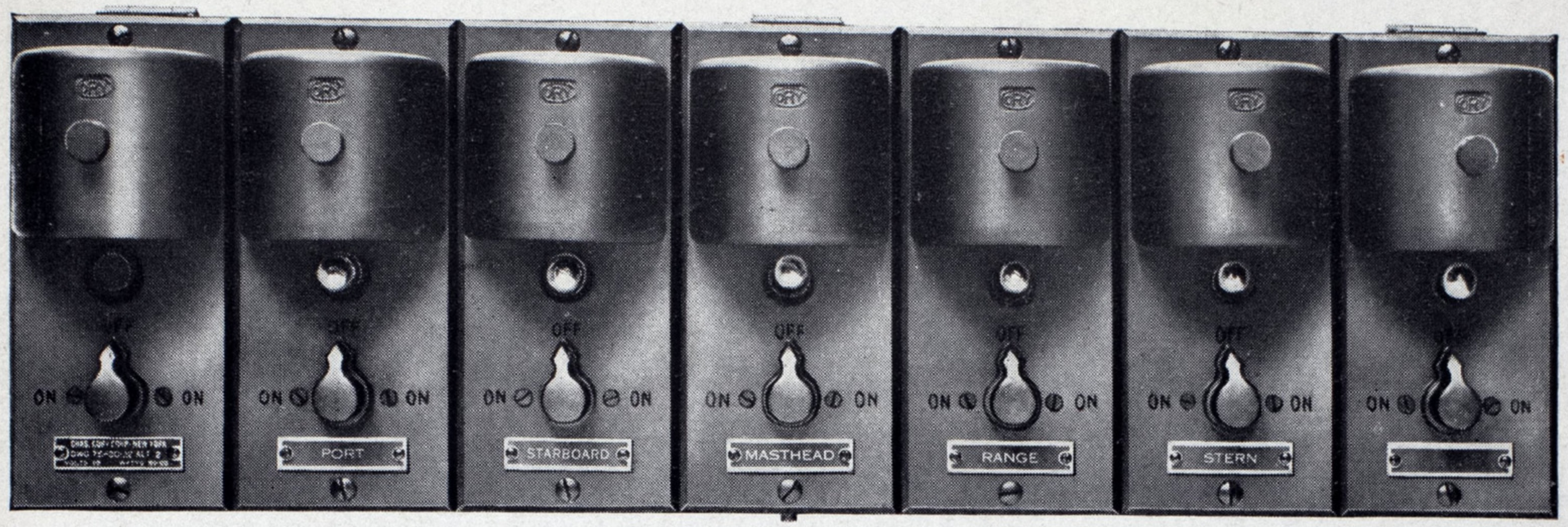
Each ship is equipped with Babcock & Wilcox Water Tube Boilers, Superheaters, Desuperheaters, Feed Water Regulators and Oil Burners. The furnaces are lined with B. & W. No. 80 Firebrick.

THE
BABCOCK & WILCOX
COMPANY

85 LIBERTY ST. NEW YORK, N. Y.

M-8

CORY
RUNNING LIGHT
SWITCH PANEL



EASY TO INSTALL, USE, AND MAINTAIN

CORY Panels are completely assembled and wired at the factory. Installation consists merely of attaching the two hinges of the panel and connecting the wires to the Running Lights or other circuits to be controlled. To install additional sections it is only necessary to lengthen two angle iron supports at the back of the panel.

Maintenance is made easy both by the quality of the material used and by the design and construction of the panel. For example: Contacts are of coin silver. The neon warning lights are guaranteed for 3000 hours of actual service. The panel is moisture-proof—no live parts are exposed. To inspect the wiring, the panel is swung up on its hinges. To inspect relays or change fuses, easily removable covers are slipped off.

Panels are made of enduring dull black bakelite. Neon glow lamps are easily visible but do not affect the pilot's vision. Switches are specially designed. The compactness of the panel and its careful finish give it a pleasing appearance and add to its convenience in use.

For further information about the Cory Running Light Switch Panel do not hesitate to call or to correspond with us or our nearest representative. This incurs no obligation on your part.

CHAS. CORY CORPORATION

DIVISION OF BENDIX AVIATION CORPORATION

NEW YORK OFFICE AND SHOW ROOM
Whitehall Building, New York

HOME OFFICE AND FACTORY
754 Lexington Ave., Brooklyn, N. Y.

MARINE REVIEW—November, 1931